



University  
of Basel

# UNINOVA

University of Basel Research Magazine — N°136 / November 2020



## Families in flux.

### In conversation

China's influence  
on the West.

### Debate

Is artificial intelligence  
a drain on energy?

### Album

Driprstone caves as an  
environmental archive.

### Essay

High-risk industries  
and safety.



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1



2



3



**1 Angelika Jacobs** joined the UNI NOVA editorial team in April this year. A molecular biologist with a doctorate from the University of Basel, she previously worked as a science editor at the *Neue Zürcher Zeitung* and the Swiss news agency Keystone-SDA. In this issue, she writes on subjects including family carers and artificial molecules used in blood clotting. [Pages 25, 33, 54–55](#)

**2 Eva Mell** has worked for many years as an editor and freelance journalist after graduating in theology, German studies and history and following training as a journalist. Her article explores the world of Basel families around 1800. [Pages 22–23](#)

**3 Christian Flierl** accompanied a group of Basel researchers into the Milandre Cave to take the series of photographs for this issue's "Album" section. The experts examine the interior of stalagmites to reconstruct how precipitation and temperature levels have varied over the millennia. [Pages 40–49](#)

## The things that unite us.

During the coronavirus lockdown, families have had to cope with either too much or too little distance between them. All of a sudden, they had to spend weeks living in each other's pockets, stressed out and torn between home working, home schooling and looking after small children with no leisure activities to let off steam. Visits to grandparents and elderly parents were out of the question, as were hugs for relatives in high-risk groups. Many older people have found it especially difficult to cope with the lack of family contact.

In extraordinary times, we often gravitate toward the things that unite us and the places in which we seek safety – in particular, our bonds with the families into which we are born and the families we create for ourselves. In this issue, we focus on the special community that family provides, presenting various research projects on this topic at the University of Basel.

We look at families in the period around 1800 and the role that upbringing and emotions played all those years ago. We explore what we gain and learn from our families, what we inherit and pass on. We also consider the diverse forms of modern families. Family is no longer what it used to be – it is much more: The traditional parent/child formation has long since expanded to include single-parent, rainbow and patchwork families. Even the model of the father as a largely absent breadwinner has changed as new generations of men crave more time with their little ones.

We hope you enjoy this issue. If you like, why not tell your family about it, too?

Angelika Jacobs,  
UNI NOVA editor





China and the West: Political scientist Ralph Weber in conversation, page 8



An evolving lifestyle: A well-off family from Basel in the 1960s.

## 6 Kaleidoscope

### 8 In conversation

China is politically more communist than it was 20 years ago. The country is converging with authoritarian movements in the West, says political scientist and philosopher Ralph Weber.

### 12 News

“Miracle”, the Körber Prize, new media catalog, podcast.



#### Cover photo

Different forms of cohabitation: father and son. (Photo: Delphine Le Berre/Getty Images)

## Dossier

# Families in flux.

### 16 Role models in conflict situations.

Arguments and disputes are a part of everyday family life. They only really become a problem if they are chronically destructive.

### 19 From male provider to marriage for all.

What constitutes a family is mostly determined by society – with genetics and reproductive medicine also involved. The legal system is hard pressed to keep up.

### 22 Loving fathers and education at home.

In the eighteenth century, knowledge transmission and emotions played a key role in families – an example from Basel.

### 25 Love and care until the very end.

Most people with a chronic or degenerative disease are cared for by a female family member.

### 26 Old norms, new aspirations.

Many of us ask ourselves how to balance family and work. Why is it so difficult to break out of traditional gender roles?

### 29 The male breadwinner remains the norm.

Survey respondents tend to under-report women's income. A possible explanation: the enduring norm of the male breadwinner.

### 33 “How should I tell the family?”

Cancer sometimes occurs as a result of a genetic predisposition. It can be challenging for those affected to tell their biological relatives.

### 34 Care and violence in animal families.

Parents looking after their young is a common feature of family life in many animal species. Yet, this often involves conflict and aggression.





Exploring the hidden depths: Dripstone caves as the subject of research, page 40

## 36 My workspace

Researchers observe the brains of mice to see how neuronal circuits bring together and process the various sensory impressions.

## 38 Debate

### The hidden carbon footprint of AI

Should energy-intensive artificial intelligence applications be regulated?

## 40 Album

### Petrified water.

Stalagmites contain a valuable climate record that stretches back farther than tree rings or ice cores.

## 50 Research

### Plants capture mercury from the air.

As a result of human activities, the amount of mercury in circulation is ever-increasing. Plants appear to play a key role in the spread of this pollutant.

## 52 Research

### Energy-saving electronics.

Topological insulators are promising candidates for energy-saving, high-performance electronics.

## 54 Research

### Smart molecules heal wounds.

Artificial molecules could help by giving a boost to the clotting process.

## 57 Books

The latest publications by researchers at the University of Basel.

## 58 Essay

### The ghost in the machine.

How high-risk industries are sustained by a culture of safety.

## 60 Portrait

### Not a trace of coronavirus fatigue.

With the pandemic, Sarah Tschudin Sutter, Professor of Infectious Diseases, faced her greatest challenge yet.

## 62 Alumni

## 66 My book

Theologian Moisés Mayordomo.

## Imprint

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Ancient civilizations

# Beads from the Early Middle Ages.

This invaluable set of 35 beads was placed in the grave of an older woman in the 6th century. She wore the adornment either as a necklace or stitched to her clothing. The find, unearthed at the Bernerring burial site in Basel, is made up of beads of various types, some of which probably came to Basel from Egypt, Italy and eastern Europe. Among the most valuable are four millefiori beads and a small amber bead, transformed into a reddish-white speckled sphere by centuries in the ground.

The Bernerring woman's precious string of beads is just one of the archeological finds in the Basel Historical Museum's collection to have been drawn, described and dated by students on the ancient civilizations program as part of their practical work. Working with Basel University teaching staff in the fields of prehistory, early history and archaeology of the Roman provinces, they studied various burial gifts from late antique and early medieval graves in the region – and exhibit them online. ■

[bit.ly/uninova-hmb](https://bit.ly/uninova-hmb)

## Biodiversity

## Orb web spiders in decline.

Not only are many insects disappearing, but so are the creatures that depend on them for food. A study by researchers from the University of Basel and Ghent University has shown that the population of European garden spiders on the Swiss plateau has fallen steeply over the last 40 years. For their investigation, the biologists counted the conspicuous wheel-shaped webs produced by these spiders in 20 representative habitats in order to calculate their population density. They then compared their findings with data from the 1970s and 1980s.

In two-thirds of the sample plots examined, the researchers found no spider webs at all. Those webs that they did find contained significantly fewer insects than in previous studies. The web threads examined were also far weaker, an indication of malnourishment within the spider population. ■



## Environmental history

## 15,000 years of the Thurgau.

What did the Thurgau look like in Roman times? How did construction of the railways during the 19th century affect forest development in the canton? These are the kinds of questions that “Climate, humanity and the environment in the Thurgau” (KUMiT), a project run by the University of Basel and the Thurgau Department of Archeology, is looking to answer. The researchers are analyzing marine sediments to reconstruct the region's environmental history over the last 15,000 years from the organic deposits that they contain.

In the fall of 2019, the team extracted sediment cores from two small privately owned lakes, the Bichelsee and the Hüttwilersee. The core from the Bichelsee, which is about 7 meters long, covers the period from the late Neolithic, around 3200 BC, to the present day. The sediment column recovered from the Hüttwilersee, which is 13 meters long, extends from the end of the last ice age, about 15,000 years ago, through to the present. These sediment cores are being prepared and analyzed in the laboratory at the Department of Environmental Sciences. ■





# “China’s party-state is deliberately trying to subvert the West.”

China is politically more communist than it was 20 years ago. The country is converging with authoritarian movements in the West, says Professor Ralph Weber, a political scientist and philosopher.

Interview: Urs Hafner Photo: Basile Bornand

**UNI NOVA:** Professor Weber, the West thrives on having an enemy far away. Is China the 21st-century successor to the Soviet Union, which itself took the place of the Ottoman Empire during the last century?

**RALPH WEBER:** No, I don’t think so. The West had hardly any economic ties to the Soviet Union, whereas China is its most important trading partner. And we are dealing with at least two Chinas. One is the traditional, imperial and – to Western eyes – “exotic” China, with its deep historical roots. The other China – the People’s Republic, under the dictatorship of the Marxist-Leninist-oriented party – starts with the communist revolution in 1949.

**UNI NOVA:** Isn’t that authoritarian China just a continuation of the old empire?

**WEBER:** Some people see it that way, with Xi Jinping, the President and – more im-

portantly – the General Secretary of the Chinese Communist Party, as the emperor with the “mandate of heaven”. It is true that Xi sometimes refers to Taoism and cites Confucius, but he only ever does so, of course, when it is consistent with the party’s ideology. The party stands above the state. It is the party that decides whom to admit and whom to exclude. If someone turns down the invitation to join, it is virtually impossible for them to pursue a career. And the party continues to wage campaigns against corruption and the influence of Western education, or, as they say in the jargon, to “improve the quality of citizens”. Citizens are to align themselves with the thought of Xi Jinping. In short, I don’t think that comparisons with the empire are helpful.

**UNI NOVA:** Marxist-Leninist communism envisaged a rational planned economy

that produces what people really need. China, on the other hand, runs a hyper-capitalist economy. How can the two be reconciled?

**WEBER:** China is state-capitalist. Many businesses belong to the state. But even the state-sanctioned private sector is controlled. If you want to succeed in business, you have to be a party member. Foreign firms must accept the presence of party members within their Chinese branches. The distinction between “public” and “private” as we know it does not exist in China. In the early 2000s, it looked like China was going to liberalize its economy, both domestically and in relation to the wider world. In the West, there were hopes that this would lead to political reforms, in line with the slogan “change through trade”. Today, China is economically more capitalist, but politi-



**“Many businesses belong to the state. But even the state-sanctioned private sector is controlled.”**

**Ralph Weber**

cally more communist, than it was 20 years ago. There has been too little recognition of that in the West, including Switzerland. Under its free trade agreement, Switzerland is pursuing more intensive economic relations with China than ever, while all too often choosing to ignore the human rights issue. That's not ok.

**UNI NOVA:** You use harsh words to describe Chinese policy, but there are many dictatorships in this world. The US practices capital punishment, and has a culture steeped in racism and an extremely sexist president. Switzerland also has a trading relationship with the US. Shouldn't it stand up for human rights there, too?

**WEBER:** The US also still runs Guantanamo... What you are doing is what I call arguing away the difference in values here. Although criticism can be justifiably leveled at the USA, it is still a liberal democratic state with separation of powers, elections and a relatively independent media that can criticize those in political power. China, on the other hand, is ruled by a party that controls all parts of the media and bans words like "separation of powers" and "civil society".

**UNI NOVA:** China isn't a Western state, and historically its culture was not "democratic". Aren't you applying an unreasonable standard?

**WEBER:** Human rights are not negotiable, nor can they be watered down for pragmatic reasons. Period. When human rights are abused, that should bring discredit not on the idea of human rights, but on those who abuse them. Communism, especially Mao's "great leap forward" and the Cultural Revolution, constitutes a huge rupture in Chinese history. Those events, and others that have happened more recently in the People's Republic of China, cannot be explained in terms of "culture". There is a reason why the Cultural Revolution is such a taboo subject in China. It is a national trauma...

**UNI NOVA:** And something that Switzerland should factor into its trade relationships?

**WEBER:** Not the trauma – the human rights. For historical reasons, Switzerland has a particular responsibility here. It was also the first Western state to recognize the People's Republic of China, as the Federal

### Ralph Weber

has been Professor of European Global Studies at the University of Basel's Institute for European Global Studies since 2014. He is currently President of the European Association for Chinese Philosophy. Weber was born in Johannesburg in 1974 and studied political science at the University of St Gallen and the Institut des Hautes Études Internationales et du Développement in Geneva. After studying abroad at the University of Hawai'i in Mānoa and the University of Peking, he completed his PhD in political science in St Gallen and his postdoctoral thesis in philosophy in Zurich. Between 2008 to 2014, he worked as a senior research associate at the URPP Asia and Europe at the University of Zurich.

Council is so keen to stress. It is kind of an outrider within the Western camp.

**UNI NOVA:** Anti-communist Switzerland smoothed communist China's path to the West. How did that come about?

**WEBER:** Neutrality and established practice certainly played a role: Switzerland recognizes a state as soon as it has established itself. The Federal Council also wanted to protect the Swiss businesspeople who were based there, mainly in Shanghai, as well as missionaries. We must not forget that Swiss businesses have been trading with China since at least the 18th century. It started with the watch and clock trade. Later, they were followed by the chemical and pharmaceutical industries. Today, many businesses are actually dependent on the Chinese market.

**UNI NOVA:** So what should Switzerland do?

**WEBER:** I'm not going to say what policy Switzerland should pursue. I'm an academic who is trying to contribute some expertise and arguments to discussion of this issue within society. But in a democracy, as we know, the power to make decisions rests with the sovereign, the courts, parliament and so on. According to my

analysis, China is building up its influence systematically within the UN, as well as in individual European countries. And putting systematic pressure on multilateralism by concluding special agreements with a large number of states that serve its interests. The party-state is deliberately trying to subvert the West. Small states like Switzerland should seek to combat that by strengthening their alliances with other states or the EU, by supporting the UN – in defense of human rights, democracy and the rule of law – and by upholding academic freedom. Multilateralism is coming under pressure from China. If we see it as something worth preserving, we have to resist that pressure. Small states benefit from multilateralism.

**UNI NOVA:** China is infiltrating the West. That sounds like a conspiracy theory.

**WEBER:** That's the kind of argument that shuts down debate and stops us having a nuanced discussion of the issue. I'm not saying that "totalitarian" China wants to subjugate the "free West". On the one hand, there is more than one China, and we have to differentiate between the people and the party. Many Chinese think that, with his cult of personality or his abolition of term limits, Xi Jinping is going too far. There is definitely criticism – although it is seldom voiced publicly, of course – not just of that, but of how he has dealt with Hong Kong, the Covid-19 pandemic or the trade war with the US, which has been damaging for China. On the other hand, the West is not just a group of free countries committed to the rule of law. For a number of years, authoritarianism has been on the rise once again within liberal democracies: Trump, Hungary, Poland, the Front National in France, the AfD in Germany and so on. If democracy matters to us, we must resist this temptation. The authoritarian movements in the West and authoritarian China are forging links with one another. The Chinese Communist Party sneers at multiculturalism and the effete liberal democracies that cannot control their populations and their borders. There are overlapping agendas here. And the coronavirus crisis seems to confirm what the authoritarians have been saying. By taking draconian meas-



ures, hasn't China been able to bring the virus under control?

**UNI NOVA:** Most authoritarians are coronavirus denialists.

**WEBER:** I'm not claiming that there is a simple dichotomy here. Norway's right-wing party is working with the Chinese. Sweden's right-wing party is pushing for the Chinese ambassador to be expelled from the country.

**UNI NOVA:** What is the Swiss Government's position?

**WEBER:** In 2017 and 2018, the Federal Council stated that the human rights situation in China had deteriorated, but in 2019 Federal President Ueli Maurer told Swiss journalists in Beijing that he didn't know whether the human rights situation had deteriorated... Yet it is common knowledge that in recent years thousands of people, including many human rights lawyers, have disappeared without trace in China – not to mention the shocking oppression of the Uighurs and Tibetans.

**UNI NOVA:** The Tibet issue seems to have disappeared from public discussion in Switzerland, doesn't it?

**WEBER:** 1999 was a milestone as regards the Tibet issue and Switzerland's relationship with China. At that time, there was a kind of thaw in relations. China was on its way to joining the WTO, and the West was hoping that economic reforms would lead to reforms in the political sphere. And then President Jiang Zemin visited Switzerland. He was welcomed by the entire Federal Council in Berne. Then a row blew up. At the edge of the Bundesplatz, some activists were demonstrating against China's policy in Tibet. This made Jiang Zemin so angry that he snapped at the Federal President Ruth Dreifuss, "You have lost a good friend."

**UNI NOVA:** Although that didn't happen.

**WEBER:** Indeed. When Xi Jinping visited Switzerland in 2017, the police made sure that those demonstrating about Tibet were kept out of sight and earshot. Instead we had government supporters brought in by the Chinese embassy, waving little Chinese flags. Although the so-called United Front, which includes the Chinese student associations, is not well-known in Switzerland, it is a tool heavily used by the Chinese party-state.

**UNI NOVA:** Speaking of the United Front, wasn't the Comintern – that is to say, the Communist International – dissolved a long time ago?

**WEBER:** The Comintern, yes, but not the principle behind it, which China continues to apply today in its own way. Its United Front is extremely active, in many guises and across the world, including in Switzerland. We also know that Chinese authorities based overseas make contact with their citizens to demand that they co-operate or – in the case of Tibetans and Uighurs – to intimidate them with reference to family members still in China. When the Dalai Lama makes an appearance in the United States, Chinese students insist on staging a "counter-demonstration", citing freedom of expression. Fudan University, on the other hand, has dropped the phrase "academic freedom" from its statutes and replaced it with "loyalty to the thought of Xi Jinping". Is normal co-operation still possible under these conditions? I think not. However, anyone who criticizes the Chinese party-state is opening themselves up to attack. In the West you will quickly be labeled "anti-Chinese" or "racist". Not only is that absurd from a factual standpoint, but it is an argument that echoes the Chinese Communist Party's claim to represent

the interests of the whole Chinese people.

**UNI NOVA:** Although racism against Chinese people is widespread.

**WEBER:** Certainly, and to some extent the coronavirus made it even worse. That is unacceptable. Nonetheless, we must be able to discuss the threat to liberal democracy, with its commitment to the rule of law. But that is something we are poorly equipped to do. There is a lack of basic knowledge within society, as well as academic expertise. We have to develop new epistemological approaches to the study of global actors and networks.

**UNI NOVA:** But a large number of universities in German-speaking countries already offer degree courses in Chinese studies, don't they?

**WEBER:** In Switzerland, the main ones are Zurich and Geneva. But we have far too few Sinologists. What is more, for understandable reasons, these disciplines often choose "culturalist" approaches – that is to say, they exclude the power issue. In political science, too, we have paid insufficient attention to authoritarianism. Over recent decades, we have worked through every possible variant of democracy. However, our understanding of authoritarian regimes, which are gaining ground across the world, is still too limited. ■

**"Is normal  
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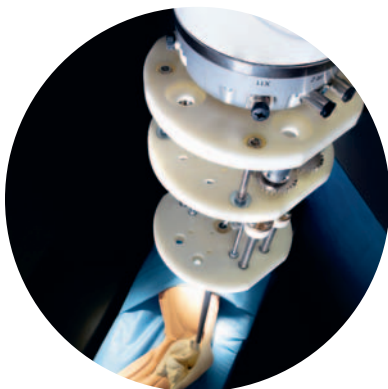
**Ralph Weber**

# A podcast, eye research and a gigantic library.

## Surgical technology

### An extra CHF 12 million for “Miracle.”

The Werner Siemens Foundation is increasing its funding for the Minimally Invasive Robot-Assisted Computer-guided Laserosteotomy (Miracle) project to a new total of CHF 27 million. In the first phase of the project, the participating research groups developed a virtual reality platform for planning surgeries, and this platform is already being used at University Hospital Basel. Among other things, the groups are also working on a novel type of endoscope with a laser bone saw for minimally invasive procedures. In the future, the idea is for medical experts to be able to use the VR platform to design the shape and composition of implants that will then be custom-manufactured using 3D printing. It may even be possible to print the implants directly within the body. ■



## Körber Prize

### Honor for Botond Roska.

Professor Botond Roska of the University of Basel and the Institute of Molecular and Clinical Ophthalmology (IOB) is working tirelessly toward his objective of restoring blind people's sight. Now, in recognition of his research into the cell types of the retina and approaches to replacing the function of defective photoreceptors, the Körber Foundation has awarded him the Körber Prize 2020. Roska received the award, which is worth EUR 1 million, in the Great Hall of Hamburg City Hall on 7 September. He intends to use the prize money to accelerate the development of new gene therapies in order to make retinal cells light-sensitive again and thereby to restore the functionality of blind retinas. The Körber Prize is one of the most prestigious awards for researchers in Europe. ■

Photos from the presentation of the Körber European Science Prize 2020 to Botond Roska at Hamburg City Hall on 7 September 2020: Dr. Lothar Dittmer, Professor Botond Roska, Professor Martin Stratmann (from left). Photo credit: Körber-Stiftung/David Ausserhofer

SLSP

## New Swiss media catalog.

From December onward, a single catalog will provide students, researchers and bookworms with access to the whole of Switzerland's inventory of academic books. Known as the Swiss Library Service Platform (SLSP), the system is the result of a collaboration by more than 475 libraries and will replace the existing library networks. The new platform standardizes all of the search portals, fees, lending periods and catalog rules of participating libraries and has a Switzerland-wide courier service at its disposal. To use the SLSP, users must re-register with their library and create a SWITCH edu-ID. The new system should be operational from 7 December onward, and there will be a period of two or three days before the switch-over during which customers of the various libraries will not be able to borrow any books. ■

New podcast

## "Here and tomorrow".

We live our lives in the here and now, but we must also spare a thought for tomorrow. As part of the Uni-Talks series, scientists from the University of Basel converse with experts and the audience on the subject of life choices, the challenges of retirement provision, the family of the future and how antibiotics can continue to be an effective means of tackling infections. Unfortunately, the number of places was – and continues to be – limited due to measures intended to prevent the spread of coronavirus. In times of Covid-19, however, one useful maxim is to make a virtue of necessity – and so, with their new podcast, the University of Basel intends to make these discussions accessible to everyone. *Hier und morgen* (Here and tomorrow) is available on all common podcast platforms. ■

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# Families in flux.

**We all have a family – and are shaped to a greater or lesser extent by its members. Yet the traditional form of cohabitation is evolving to favor new constellations.**

**The concept of the family is becoming increasingly complex in today's societies.**



# Role models in conflict situations.

Arguments and disputes are a part of everyday family life. They only really become a problem if they are chronically destructive – as Dr. Letizia Gauck and her colleagues observe on a daily basis at the Center for Developmental and Personality Psychology.

Text: Pascale Hofmeier

**B**jörn, 7, is something of a rascal. He's very active, and loves to play pranks. He once poured water into a classmate's schoolbag; more than just harmless mischief, in his mother's view. "It's not that bad," counters his father – boys will be boys, after all. The problems in Björn's family have become so disruptive that his parents decided to seek help from the University of Basel's Center for Developmental and Personality Psychology (ZEPP) – along with 150 other families in the last year. "In Björn's case, the child's behavior has led to a couple conflict," explains Dr. Letizia Gauck, psychologist and psychotherapist, and head of the ZEPP. "Couple conflicts of this sort are often at the heart of family conflicts."

**“A discussion that for one family simply reflects an animated style of communication might feel like an utter catastrophe to another.”**

Letizia Gauck

It's the dark side of family life: Every day, a host of different commitments, needs and desires collide. Some of them are easy enough to reconcile, but in many cases a dispute is unavoidable. For most couples, there is no shortage of contentious issues: parenting, housekeeping, hobbies, finances, annoying habits or the partners' respective families.

## Plenty to argue about

Some areas of conflict are dependent on income level, recent research from the US has shown: couples with a lower income are more likely to argue about financial matters and substance abuse. For higher-income families, meanwhile, disputes are more likely to focus on communication or domestic chores. And the more burdens a family faces – from unemployment to debts or even measures to stem the coronavirus pandemic – the more conflicts are likely to arise. Arguments between parents and children, meanwhile, most commonly involve media consumption, school, homework and rules. However, whether or not those involved perceive an argument as a conflict is highly subjective: “A discussion that for one family simply reflects an animated style of communication might feel like an utter catastrophe to another,” says Gauck. According to the type of argument and the emotions that accompany it, psychologists distinguish between critical, negative interactions, on the one hand, and constructive con-



flicts on the other. If a couple – or family – is able to resolve its conflicts constructively, the result is positive development. “To resolve a conflict constructively, it helps to open up emotionally. Respect, active listening, willingness to compromise and a healthy dose of humor all help, too,” says Gauck. What is more: “You need at least twice as much positive feedback as criticism for a constructive discussion.”

A chronically destructive dynamic, meanwhile, in which the participants demean and deliberately hurt each other, can have especially harmful effects. “Children are observers, and parents are role models. Children adopt their parents’ strategies. If one of them yells or becomes aggressive, children see that and learn these behaviors,” says Gauck.

#### Show negative feelings too

This does not, however, mean that parents should hide away all their negative emotions from themselves and their children. “Many parents think that unpleasant feelings and thoughts should not exist,” says Silvia Meyer, a psychologist working at the ZEPP. These feelings often convey important information: anger indicates that a line has been crossed, while fear can be a response to a real threat. “Children need to learn to recognize these emotions and deal with them appropriately,” adds Gauck. If parents conceal these feelings from their children in day-to-day life, they are depriving them of the opportunity to experience them. This can lead to conflicts later on – for instance at school, or as adults when the time comes for them to start their own family.

Chronically destructive arguments in families over extended periods can have serious repercussions: the children of parents who quarrel frequently are more emotionally insecure, often feeling responsible for the conflict between their parents. Recent results from the University of Wisconsin-Madison have shown that behavioral problems can occur in children who are present when their parents argue and are themselves the subject of the discussion. In addition to the children who experience distressing separations or divorces, it is estimated that some 20 percent of children are exposed to chronically destructive family interactions. “In our experience,

however, there is no connection between how a family deals with conflict and whether its members live together or apart,” says Meyer. Yet what can families do to escape the negative spiral? “That depends very much on the individual situation, and can be extremely difficult without external help,” says Gauck. “Here at the ZEPP, we always look for a solution that fits the family system in question. A key aspect of this is having realistic, achievable goals.” In the case of Björn and his parents, it emerged during counselling that the father had been very harshly disciplined as a child. This led him to adopt a laissez-faire approach in his own parenting, reflecting his family of origin, says Gauck. At the ZEPP, the couple is now exploring which boundaries can give their son the stability he needs, and how they can help him to control his impulses.

Alongside this approach, rooted in behavioral therapy, the counselling offered at the ZEPP employs other tried and tested psychological methods and, where necessary, validated diagnostic tests. This yields a wealth of data, some of which can be leveraged – with the consent of those involved – for research purposes. ■

#### Conflict among siblings

Recent research shows that in early childhood siblings tend to quarrel 6 to 8 times an hour and significantly less frequently in later childhood and adolescence. The most common arguments are about who something belongs to, or how a particular game should be played. During middle childhood, a shift in focus can be observed, with conflicts among siblings centering on provocations, socially intrusive behavior and threats.



**Letizia Gauck** is a psychologist and psychotherapist who specializes in assessment, counselling and therapy for children, adolescents and adults. The main focus of her work and research is on identifying and fostering exceptional talents.



**Silvia Meyer** is a doctoral student of educational psychology, development diagnostics and educational guidance at the University of Basel. Her research focuses on the role of sports and movement in the context of psychology. As a psychologist, she also provides guidance to children and adolescents on the subject of self-esteem.



# From male provider to marriage for all.

What exactly constitutes a family is mostly determined by society – with genetics and reproductive medicine also playing an increasingly prominent role. The legal system is hard pressed to keep up, and laws have to be regularly revised.

Text: Christoph Dieffenbacher

**F**rom the traditional male breadwinner model to modern patchwork structures, the family – often described as “the smallest unit of society” – can take on an ever-wider range of guises in Western states. The concept is typically understood as a group comprising parents and children living under the same roof – although this description is not necessarily accurate, either today or in the past. Does the family merit special protection or privileged treatment compared with other forms of cohabitation? Does the institution of marriage still mean anything? What defines the relationship between parents and children? What is the role of new partners, same-sex couples or adopted children?

## The nuclear family as standard

The issue of family and its changing forms is an ongoing challenge for legislation and politics alike. A relatively recent development in Switzerland is the option of registered partnerships for homosexual couples, introduced in 2007. The idea of “marriage for all”, whereby the state acknowledges formal life partnerships for

all couples regardless of gender or sexual orientation, is currently under debate. Switzerland still lacks specific legislation on the status of couples that choose to cohabit without getting married, or of rainbow or patchwork families that include children from previous relationships. In France, meanwhile, heterosexual couples can also choose to formalize their relationship with a special contract (“Pacs”) rather than get married.

Legal systems can struggle to keep up with the diversity of modern family arrangements. “There are far more socially acknowledged and accepted kinds of family than those recognized by law,” says Professor Jonas Schweighauser, an honorary professor of family law at the University of Basel and a practicing lawyer in Binningen, married with two daughters. In spite of this proliferation of family structures, Schweighauser believes that many people still think of the nuclear family – a couple with children – as the measure of all things. At the same time, he points out, current legislation is heavily biased toward traditional marriage.



**Jonas Schweighauser** is an honorary professor for family law at the University of Basel and a partner in a legal firm in Binningen, Switzerland.



Until 1983, a woman wishing to work outside the household – or simply open a bank account – had to have permission from her husband as the head of the family, while the practice of “concubinage” remained illegal in the cantons of Valais and Schwyz well into the 1990s: cohabitation was punishable by law and prosecuted by authorities. Homosexual couples were discriminated against, and children born outside marriage – along with their mothers – were socially ostracized and neglected in legal terms.

### Openness and individuality

None of this was especially long ago. Yet, family law has since gone through a period of radical change toward greater openness and individuality: “In fact, the shift from a restrictive to a liberal understanding of what the law regards as a family occurred relatively quickly,” Schweighauser explains. Whereas the idea of “marriage for all” was barely accepted just a few years ago, surveys show that it is now favored by a majority of Swiss people.

Nevertheless, if Switzerland were to introduce such a law it would be one of the last countries in western Europe to do so.

Besides social pressures, changes in family law are driven above all by developments in reproductive medicine, Schweighauser says. For instance, whether or not two people are directly related can now be ascertained by means of a simple genetic test, leaving little room for doubt as to the identity of a given child’s father. Still, medical procedures such as in vitro fertilization or surrogacy raise new issues requiring legal clarification. Switzerland is behind the international curve in these areas, Schweighauser explains, which is not necessarily a disadvantage. For instance, many countries already have legislation allowing certain areas of reproductive medicine, whereas in Switzerland surrogacy and other reproductive procedures remain forbidden to unmarried couples. The differences between different legal systems are problematic in that parents can circumvent the laws of their own country by having their child carried to term and born abroad.

**“There are just as many good and bad marriages today as there were 50 or 100 years ago.”**

**Jonas Schweighauser**

Whereas Schweighauser mostly deals with separations and matters of child law in his daily work as a lawyer, he also offers free legal advice at the University of Basel. Every now and then he is approached by a young couple considering marriage: “I recommend getting married when one of the two partners is faced with a reduction in income, for instance if they are planning to have children.” The reason for this is that it gives the economically less powerful person – usually the woman – greater protection than they would otherwise receive.

### Institution with a future

Schweighauser is confident that the family is an institution with a future, even in light of the high rates of divorce: “I am convinced that there are just as many good and bad marriages today as there were 50 or 100 years ago.” Whereas couples in previous centuries had children as a way of providing for old age, today people enjoy much greater state support. Meanwhile, he believes that the current divorce rate of over 40% is explained primarily by the fact that people can now afford to get divorced – in the past, couples were forced to stay together, quite literally until death did them part.

Definitions of family life can also take unusual forms. A growing trend in Germany is the practice known as co-parenting, Schweighauser explains: adults form partnerships in order to have a child, with no intention of entering into a relationship themselves. An association helps would-be co-parents find like-minded partners online.

Under this model, two people have a child together – generally by means of a sperm donation – which they raise jointly, often without living together. In legal terms, their rights as parents are no different to those of other couples – the only difference being their decision to completely dissociate child-raising from having a romantic relationship. “Couples of this sort probably put a lot more thought into having children than many others,” Schweighauser remarks. ■





# Loving fathers and education at home.

Two historians are studying the role of knowledge transmission and emotions in Basel families of the eighteenth century. Research has long overlooked the fact that the Enlightenment was focused not only on reason, but also on emotions.

Text: Eva Mell

**G**ood Lord! Was it possible? This was our child! My heart was gripped with completely unfamiliar emotions that I had never experienced before.” This is how one eighteenth century father described his first encounter with his daughter. “She was crying. She seemed to look at me with her bright eyes and then fell silent. That look was crucial, for it awoke in me a sense of fatherly love.”

Fathers who cared for their pregnant wives, who spoke of a profound love for their children or who sat at their sick infant’s bedside for nights on end – personal accounts like these are commonplace to Claudia Opitz, Professor of Early Modern History at the University of Basel. Her doctoral student Elise Voerke, who studies the rearing of children in bourgeois Basel households between 1750 and 1830, adds: “In those days, the demands on fatherly love were as great as those on motherly love. In general, however, mothers were responsible for physical care, while fathers were responsible for educating the older children.”

## Education within the family

History therefore tells us that the close involvement of fathers in today’s domestic life is actually nothing new. By the eighteenth century, fathers were no longer expected to play the role of authoritarian patriarchs, but rather to act as affectionate leaders of the family unit. As part of a project entitled “Doing House and Family”, Opitz and Voerke are studying how knowledge was produced and communicated in bourgeois Basel families of the eighteenth and early nineteenth centuries, as well as the role played by emotions.



**Claudia Opitz**  
is Professor of Early Modern History at the University of Basel and specializes in women and gender history.



**Elise Voerke**  
is a doctoral researcher with the Basel Graduate School of History at the University of Basel.

When it comes to knowledge transmission, the two researchers also see parallels between families of the eighteenth and twenty-first centuries. “As a last resort, we close the schools – but not the families,” Opitz says in reference to the state of emergency declared during the coronavirus pandemic. “This is because families still have a societal role to play in children’s education.” In the eighteenth century, this was the norm: education was a family matter.

Indeed, in the century of Enlightenment, the ideal scenario was for children to be educated individually in an environment that was as loving as possible. In those days, however, bourgeois as well as noble parents enjoyed the support of grandparents, uncles, aunts or domestic staff who were integrated into the family. Education was a project for the extended family and helped forge and strengthen internal relationships.

## Romantic marriage becomes the new ideal

At first, knowledge transmission and emotions appear to be two completely different spheres of domestic life. Opitz explains that the opposite is actually the case: the two spheres are inseparable when it comes to a person’s education. In the Age of Enlightenment, the German term *Bildung* (formation) was used to refer to a holistic concept. “*Bildung* meant that the person was educated, or raised, in a holistic manner,” as Opitz explains. In the eighteenth century, this was about more than just the accumulation of knowledge. Just as much emphasis was placed on character formation and emotional development. As a lifelong project, *Bildung* affected not only the younger generation but all members of the family.

“For a long time, researchers overlooked the fact that the Enlightenment debate around human nature related equally to the emotions and to the mind,” says Opitz. “It wasn’t just about the idea that emotions fundamentally shaped the human condition. There was also a recognition that emotions made social cohesion possible in the first place.”

Emotions were very much en vogue in the eighteenth century. This was not only the age of pedagogy and Enlightenment, but also the age of sentimentalism. The literature of the era was awash with emotion: “Goethe’s novels and Sophie von La Roche’s *Geschichte des Fräuleins von Sternheim* [The History of Lady Sophia Sternheim] are virtually textbooks on how to write love letters and express your emotions.” Personal diaries and letters of the era are also characterized by emotionally charged language, and romantic marriage became the new ideal – one that, although it was by no means always accomplished, was desired by more and more young people of the middle class.

Emotions and education within the family sphere even seemed to mutually reinforce one another: spouses who were in love would educate themselves, read and debate things together – and by doing this their love could grow. “There’s a lot of plausibility in this hypothesis,” says Opitz, but Voerkele disagrees: “I’m not entirely sure about the formula whereby more emotions equal more education and vice versa, because my research has only given me an insight into the upper strata of society. Are we saying there were no emotions in less-educated strata?”

### Respect for emotions

This touches on a significant point. The two researchers’ insights into knowledge transmission and emotions in Basel families at the turn of the 19th century relate primarily to the upper middle class – in other words, to about 12–15% of the population at the time. This is mainly due to the sources from which the information was obtained. Personal accounts such as diaries or letters were more likely to be written, kept and archived by people from upper social strata.

There is also no robust way of measuring whether parents in the eighteenth century felt more strongly – or differently – toward their children than was the case in the past. “To some extent, we simply have a greater volume of source material available that highlights emotionality,” says Opitz. What they can say for sure, however, is that new values came into play in the eighteenth century. In general, emotions were becoming in-

creasingly important – and so too was the love that parents felt for their children.

Incidentally, emotions were also more and more acceptable for fathers, because feelings could not only be expressed in the private sphere but were seen as the basis for society as a whole. “Today, we tend to say that feelings are just for families,” says Opitz, “whereas outside, in the world of work, reason governs. In the Age of Enlightenment, things were much more balanced.” This respect for emotions was lost primarily in the nineteenth century, which was dominated by political struggles, confrontation and militarization. Emotions were seen as a sign of weakness and banished to the family sphere, from which fathers were increasingly estranged both physically and emotionally – for example, when they had to complete their military service or go to work outside the home.

Opitz believes it is time for us to reconsider the concepts and values of the eighteenth century. Many ideals, such as romantic marriage or the freedom to choose an occupation based on one’s own inclinations, were by no means available to everyone at the time. Nevertheless, she says: “Human beings were seen as a combination of emotions and rational choices. Today, we can take this as a renewed opportunity to learn that we need both things – the mind and emotions – not only in the private sphere, but also in schools, in learning and working life alike.” ■



Families had a social obligation to educate their children: family portrait by Peter Burckhardt-Forcart. (Cropped image: Basel Historical Museum, Peter Portner.)







# Love and care until the very end.

Text: Angelika Jacobs

**Most people who develop a chronic or degenerative disease are cared for intensively by a female partner or daughter. Medical ethicist Christopher Poppe interviewed family carers of individuals with amyotrophic lateral sclerosis to find out more about their situation and needs.**

Caring for a family member can push a person to their limits. One extreme scenario is the palliative care provided to individuals with amyotrophic lateral sclerosis (ALS). Every year, around 100 to 150 people in Switzerland are diagnosed with this devastating condition, which affects the nervous system and gradually results in total paralysis. A few years ago, the Ice Bucket Challenge raised awareness of the disease worldwide – celebrities and individuals poured buckets of ice-cold water over themselves, posted the videos online and donated as well as raised money to help fund research into potential treatments.

## Focus on the patients

So far, however, the approved medication to alleviate ALS can only slow its progress and extend a patient's life by a few months. A cure has not yet been found. "At the moment, once a person is diagnosed, the sole focus is to maintain their quality of life for as long as possible," explains Christopher Poppe, a doctoral student of biomedical ethics. This also raises ethical questions, for example relating to artificial feeding and respiration. Christopher Poppe is writing his dissertation on palliative care for ALS pa-

tients under the supervision of senior researcher PD Dr. Tenzin Wangmo from the Institute for Biomedical Ethics at the University of Basel. His research focuses on the people who provide the lion's share of this care: family members, usually women. "Existing support options focus – justifiably – on the patients. Their relatives are not at the center of care."

## Always one step behind

One reason may be that ALS usually progresses very rapidly. "Many caregiving relatives say that they always seem to be one step behind," explains Poppe. "By the time they receive the walker they've ordered, their relative might already be in need of a wheelchair. Or they can't convert their house quickly enough to keep pace with the disease." He has spoken to 36 individuals and specialists in German-speaking Switzerland who are currently providing care or have done so in the past. While he has not yet analyzed the interviews in detail, he was deeply moved by the labors of love performed by car-

egivers – usually wives and daughters. "This is an inconceivably intensive time with a very close, caring relationship."

Poppe was surprised to find that, until the death of their family members, carers regarded their own psychological well-being as secondary and rarely accessed the support services on offer. "They probably have very little time to think about their own burdens and feelings," he says. This suggestion is backed up by the strong grief reactions many carers experience after the death of their family members. This is the first time they have paid attention to their own feelings, opening the floodgates to the sadness they have previously pushed aside.

Carers tend to focus on practical issues such as organizing technical aids or how exactly to administer pain relief. The study participants particularly welcomed the development of mobile palliative care teams who can help relatives to provide care in the home and give valuable guidance, especially in the final phase of the disease. ■

**"This is an inconceivably intensive time with a very close, caring relationship."**

Christopher Poppe

# Between old norms and new aspirations.

These days, balancing family and work is an issue for mothers and fathers alike. The Center for Gender Studies is examining why we find it so difficult to break out of traditional roles.

Text: Samanta Siegfried

**A**ccording to a 2019 UNICEF study, Switzerland is the lowest-ranking country in Europe when it comes to balancing family and work commitments. Although the concept of the family is now in flux, over 80% of the Swiss population lives in nuclear families. Dr. Diana Baumgarten, a family sociologist and gender researcher in the Center for Gender Studies at the University of Basel, is investigating why this is the case and how social understanding of the role of the family is currently changing. “These days, both genders face similar struggles to balance work and family,” says Baumgarten. Yet, women and men approach the problem from opposite angles: “While women strug-

gle to balance family commitments with their careers, men struggle to balance work commitments with their families.” She describes the current ideal of motherhood as the “mother who works part-time and assumes primary responsibility for the child.” Conversely, the ideal of fatherhood is the “emotionally involved, present breadwinner.” There are various reasons for this tension. “Gender research suggests that neither structural nor individual conditions are the cause of this,” says Baumgarten. “Rather, these two approaches must be included in research and observed to see how they interact.”

## Male career-centeredness

Research shows that historical developments have a great deal of influence. With the rise of the bourgeoisie in societies shaped by Western norms, a specific ideal evolved that determines perceptions of the family to this day: the middle-class, patriarchal nuclear family. This is characterized by the separation of professional and family life, and the gender-specific division of work: employment is assigned to the masculine sphere, family to the feminine. “Traditional gender and family norms may be treated more flexibly today, but they remain powerful,” Baumgarten concludes.

One example is the notion that men achieve success outside the home, women within the family. “Full-time work and a career remain key to a man’s identity,” says Baumgarten. If they are lost, he may become psychologically unsettled, and find himself questioning how to give meaning to his life and earn

**“These days, both genders face similar struggles to balance work and family.”**

**Diana Baumgarten**

respect. “These ideas are deeply entrenched in our identity,” Baumgarten explains. “We can’t simply decide to take them away.” It is not just society that demands fathers take economic responsibility for the family; as a general rule, women expect this of their partners and men expect it of themselves. This was demonstrated by a survey of 30-year-old men and women conducted as part of a research project at the Center for Gender Studies. Most of the women surveyed stated that they wished to continue working after starting a family – even if only on a part-time basis. Yet, hardly any of the women gave financial necessity as a reason for continuing to work. This means that the majority of the women would rely on their partners for economic security. This expectation is also reflected in men’s desire for children: for men, starting a family is much more strongly linked with socioeconomic status and the ability to secure the family’s income. However, it has been evident for some time that we are moving away from the middle-class family ideal. “Many modern men don’t want to be the type of father who only sees his children in the evenings and at the weekend,” states Baumgarten.

### World of work less attractive for women

This juxtaposition of old requirements and new aspirations for fatherhood means that fathers are now living a contradiction. For example, nine out of ten fathers claim that they would like to reduce their workload; however, only one in ten fathers actually reduces his workload to have more time for his family.

In turn, modern women increasingly define themselves based on their career. More and more women have a fixed professional identity before giving birth. However, Baumgarten explains that “the ideal of a good mother who takes full responsibility for the family remains very dominant.” Many women would still define themselves in terms of motherhood. “Women often see the family as their own space in which they are their own boss – unlike the workplace.” The family is a kind of private haven; in contrast, the sphere of work is shaped by competition and controlled by others. If not already apparent, this is when our society’s structural problems come to the fore. As Baumgarten says: “Many women see badly paid service jobs as their only alternative.”

In her work, Baumgarten indicates how feasible it is for fathers to work part-time and for mothers to continuously engage in gainful employment in individual professional sectors. She concludes that: “While many fathers – fearing damage to their careers – never actually avail of the measures designed to help them reconcile family and work, women usually resign themselves to scaling back their professional ambitions and learn to be satisfied with fewer opportunities for career development.” Changing this would require childcare options and a different working time policy that does not demand constant availability.

### Lack of public debate

Baumgarten believes that public debate on this topic is urgently required. “Family matters are regarded as extremely private in Switzerland.” The interviews with 30-year-old men and women also showed that balancing work and family is seen as the individual’s responsibility. As a consequence, the notion that the state and society are responsible for putting equality into practice barely registers in German-speaking Switzerland. “Societal visions for and changes to working and living conditions are scarcely considered or even encouraged,” says Baumgarten. This means there is a lack of role models and enforcing true equality is largely left to individuals. And yet Baumgarten says there would be nothing but advantages to enabling a work/life balance: “Children benefit from having two equally available parents, parents benefit from knowing their way around both areas of life and being able to exchange ideas – and they don’t lose sight of their long-term career goals.” ■



**Diana Baumgarten** works as an assistant lecturer at the Center for Gender Studies at the University of Basel.





# The male breadwinner remains the norm.

More women outearn their male partner than commonly thought. Survey respondents tend to underreport women's income, while overreporting that of men. Two economists link this systematic misreporting to the male breadwinner norm.

Text: Samuel Schlaefli

**G**ender issues are a relatively new field in empirical economic research. This is partly because much of the relevant data has only become available in the past few years. Furthermore, there has long been hesitation in linking datasets. With burgeoning public interest in gender and family issues, empirical work on the topic has also increased. "Politicians today want to know what economic impact interventions in family taxation, parental leave or child-care will have," says Dr. Anja Roth. Until March this year, Roth was a doctoral student in the research group "Applied Econometrics" led by Professor Kurt Schmidheiny and, now a visiting researcher, she has specialized in gender and family economics.

## Distorted survey results

For their project "Gender norms and income misreporting within households", Roth and her colleague Dr. Michaela Slotwinski examined data from the Swiss Labor Force Survey for the years 2012 and

2015. They study the phenomenon that the distribution of women's incomes as a share of total couple income bunches at precisely 50 percent and shows a distinct drop thereafter. In other words, a large number of women earn slightly less than or exactly as much as their partner, but very few earn more than their partner. "In the past, this discontinuity has been attributed to couples adjusting their relative workload such that the man earned more," says Roth.

Unconvinced by this explanation, the two economists compared the earnings reported in the survey with data from social security registers. With help from the Swiss Federal Statistical Office, they were able to match each survey respondent's income to their actual incomes listed in the register using their insurance number. The outcome: "34 percent of surveyed couples where the woman outearns her male partner underreport the female contribution to household income such that the man earns more," says Roth. She attributes this phenomenon to gender-

specific norms: "In many families, the prevailing view still is that the man should contribute the larger share to total family income."

What are the determinants of this kind of behavior? On the basis of the available socio-economic data, Roth and Slotwinski identified the following factors: couples where women earn more than their partners while at the same time having a higher level of education or working longer hours are less likely to misreport incomes in surveys. In couples where the man is younger than or the same age as the woman, misreporting was also less frequent. Focusing on immigrants, their response behavior is affected by gender norms in their country of origin: couples from Sweden or Denmark are less likely to underreport the woman's income than those from France or Albania.

The distortions in the survey results identified by the economists have major implications, as they have the potential to overestimate the gender wage gap. How-



**Anja Roth**

was a visiting researcher in the “Applied Econometrics” group at the University of Basel’s Faculty of Business and Economics.



**Michaela Slotwinski**

is a research associate and postdoc in the field of political economics at the University of Basel’s Faculty of Business and Economics.

ever, the study does not challenge Swiss numbers on the gender wage gap – currently 12 percent – as reported by the Swiss Federal Statistical Office. These numbers are based upon the Swiss Earnings Structure Survey, where earnings information is reported by employers – in contrast to the US, for example, where the gender wage gap is calculated on the basis of population surveys.

Another study on family economics by Roth and Slotwinski, in collaboration with Dr. Matthias Krapf of the University of Lausanne, focused on how the availability of childcare affects the “child penalty” – the increase in the earnings difference between women and men following the birth of a child. “In Switzerland, earnings differences between women and men increase by 70 percent on average following the birth of their first child,” says Roth. After having their first child, most women work shorter hours or seek more flexible jobs, which often pay less. Around 20 percent of women stop working altogether. In short: “The birth of their first child, which most women in Switzerland have between the ages of 30 and 35, has a detrimental effect on female earnings for the rest of their lives.” This is true even for women who are better educated and who had a higher income than their partner before having children.

#### **Childcare institutions reduce inequality**

Focusing on the Canton of Bern, the researchers compared the child penalties of families living in municipalities with childcare facilities at the time of the birth of their first child to child penalties of families living in municipalities with no such facilities. They drew on anonymized cantonal tax data for the period from 2001 to 2015 and tracked families’ earnings evolutions from three years before

the birth of the family’s first child to six years afterwards. In municipalities with childcare facilities, the earnings decrease six years after the birth of the first child was reduced from 71 percent to 67 percent. For low-income families, the difference was significantly more pronounced: It reduced from 74 percent to 63 percent. “This is probably due primarily to the fact that higher-earning couples have access to other forms of childcare even in the absence of childcare facilities.” This suggests that childcare facilities operating a progressive income-based payment model could contribute to greater social equality.

#### **No change in combined family income**

A striking conclusion, meanwhile, was that in families where the availability of childcare facilities enabled the woman to contribute more to the couple’s combined income, total couple income remained largely unchanged. Roth believes this is because particularly in lower-income families, the man tends to compensate for the loss of income following the birth of the first child by working longer hours or taking another job. In other words, the availability of childcare facilities in a municipality takes the pressure off the man to increase his earnings. For Roth, there is no question: “If the goal is to reduce income inequality, strengthen women’s participation in the labor market and promote equal opportunities within couples, the availability of subsidized childcare clearly has a positive effect.” ■









# “How should I tell the family?”

Interview: Angelika Jacobs

**Cancer sometimes runs in families and occurs as a result of a genetic predisposition. However, it can be challenging for those who have the genetic predisposition to tell their biological relatives that they might also be carriers of the same cancer gene. Professor Maria Katapodi researches ways of providing support in conveying information to family members.**

**UNI NOVA:** Professor Katapodi, let’s imagine that I develop cancer. Should I be worried that my direct relatives also have an increased cancer risk?

**MARIA KATAPODI:** That depends on the type of cancer and your age at diagnosis. There are known genetic risk factors for around 10 percent of cancer types, and they are assumed to exist for another 20 percent. In the event of certain warning signals, the physicians treating you would suggest genetic testing.

**UNI NOVA:** What might those warning signals be?

**KATAPODI:** A cancer diagnosis at a relatively young age, meaning younger than 50 years old, a recurrence of the same type of cancer after a number of years, or previous cases of cancer in multiple relatives from the same side of the family. If your genetic testing shows that you have a cancer gene, you should let your biological relatives know so that they can also seek advice. However, only a small fraction of relatives receives this kind of information.

**UNI NOVA:** How high is the number of people left in the dark?

**KATAPODI:** There are no exact figures yet – that’s something we’re working on. However, there are estimates based on past studies. For genetic risk of breast and

ovarian cancer, only around 30 percent of relatives are given the appropriate information. For Lynch syndrome, which is associated with a high risk of colorectal cancer, the number is as low as 15 percent.

**UNI NOVA:** Why is this?

**KATAPODI:** There are various reasons. One is a lack of communication within all members of a family. A patient may have long since lost touch with certain relatives, or barely know them at all. Another factor is poor networking among healthcare institutions. We are conducting a study called “Cascade” to determine the exact reasons and develop more effective strategies to reach out to relatives and give them the information they need.

**UNI NOVA:** Do you have any initial results?

**KATAPODI:** Yes. For example, we have found that most patients feel that they are responsible for informing their family members. They don’t want to leave this task to their physician. But the question “How should I tell my family?” is a difficult task for many of them.

**UNI NOVA:** What can be done to make the process easier?

**KATAPODI:** One option is to pass on the information via a proxy within the family. This role is often taken on by mothers. They and other female relatives can then pass on the information in a “cascade” process.

**UNI NOVA:** But what if no proxy can be found?

**KATAPODI:** Our surveys show that most patients consider a confidential web-based platform to be an appropriate tool to facilitate communication with relatives. Accordingly, we are developing a platform of this sort in a second study, “Dialogue”. We’re still in the early stages of that but we’re interviewing members of

these families to find out how we can provide them with personalized cancer information.

**UNI NOVA:** Perhaps some relatives don’t want to know that they have a genetic risk.

**KATAPODI:** It’s obviously up to them whether or not they get tested. Many people are afraid of the possible consequences of a positive genetic test. For example, they are afraid of being pressured into a prophylactic operation. I’m sure you remember Angelina Jolie, who opted for this step in light of her very high genetic risk of breast and ovarian cancer.

**UNI NOVA:** It’s understandable to be afraid of such a radical intervention.

**KATAPODI:** But taking advice from a genetic specialist doesn’t mean that an operation will inevitably follow. No one would suggest that a 25-year-old with a high risk of ovarian cancer have her ovaries removed, triggering an early menopause. In a case like this, regular check-ups are a more appropriate option. For a 45-year old, a prophylactic operation is at least worth discussing. I can only recommend that people seek sound advice from a credible source, for example a genetic specialist, in order to make an informed decision. ■



**Maria Katapodi**

is Professor of Nursing Science at the Department of Clinical Research. Her primary research focus is personalized cancer prevention.

# Care and violence in animal families.

Parents looking after their young is a common feature of family life in many animal species. The goal of parental care is to ensure offspring survival. Yet, this often involves trickery and conflict, and sometimes even naked aggression.

Text: Christoph Dieffenbacher

**T**he ground nest is in turmoil: a mother earwig of the European species *Forficula auricularia* is feeding her young. Only a few of them can survive, so the earwig larvae have developed a ploy to boost their chances: a wax-like substance forms on their skin, making them smell like well-fed specimens. This prompts their mother to give them a bigger share of the food. After all, it makes sense for her to invest in offspring with higher chances of survival. Conversely, the young earwigs can also smell when their mother is sick, meaning that provisions are likely to be scarce. In short: the earwigs communicate with each other.

Likewise, the caterpillars of gossamer-winged butterflies produce chemical substances that make them smell familiar to worker ants, tricking the ants into adopting and raising them. Larvae of the burying beetle use their legs to tickle their parents' heads, causing them to regurgitate their food and give it to their offspring, while juvenile treehoppers vibrate the branch they are on to signal danger and request maternal assistance.

## Cost-benefit analysis

Ingenious young insects employ countless tricks and survival strategies of this sort. Are they unique in this regard? "Other species exhibit a broad range of intra-family care arrangements, too – as well as rudimentary forms of communication, and conflicts," says zoologist Dr. Mathias Kölliker, formerly an SNSF professor at the University of Basel and now a curator at Basel's Natural History Museum

and a family man himself. Kölliker used to explore the evolution of family life in animals by studying earwigs. Today, he deals with fundamental questions in ecology and evolution, publishing papers and curating exhibitions.

Parental care increases the chances of an animal's genes living on in its offspring. For this to happen, protection against harmful germs and predators is a must for all living beings. Many species, Kölliker says, simply leave their offspring to their own devices – such as frogs that lay their spawn in water. In these cases, survival is left to chance. In the course of evolution, under certain conditions species that developed care strategies – which, to begin with, consist in staying with their offspring and protecting them – prevailed. It is simply a matter of weighing the costs against the benefits, Kölliker says: "Care involves expending energy and time that progenitors could otherwise use to reproduce." Later in the evolutionary process, parents began to supply their newborns with food and teach them basic skills to help them manage life on their own and compete successfully. Over time, this has led to a growing dependence of young animals on their parents that can no longer be reversed: for birds and mammals, brood care has become so important as to be indispensable. "Without parental care and nurturing, these young animals wouldn't stand a chance."

## Keep it down!

Hungry offspring have come up with a variety of ways to draw attention to themselves: birds cheep,

for instance, while insects produce pheromones – smells undetectable to the human nose. Adult birds, for their part, use warning cries to keep their offspring from begging for food too loudly whenever a bird of prey is circling overhead. “Once brood care emerges in the evolution of certain species, it is followed by communication and social contact, and consequently a form of family life, a first step toward more sophisticated forms of co-existence,” Kölliker observes, adding that this is even the case when animals are manipulated into caring for the offspring of another species, as in the case of cuckoos or gossamer-winged butterflies.

He reports that for many insects and mammals, it is primarily the females that care for their young, while in birds the burden is almost invariably shared between male and female. However, “parents often disagree about which of them should perform a given task, which can also lead to conflicts.” In the case of certain insects and most species of fish, it is the males that look after offspring, while females defend their territory. A particularly extreme example of parental care described by Kölliker relates to certain female spiders: After laying their eggs, they sacrifice themselves by predigesting their insides and lying on top of the spiderlings, which consume their mother’s body until she eventually dies.

In species where the male parent is not involved in brood care, offspring are sometimes killed by males. This can occur in species as diverse as earwigs, lions or polar bears, requiring females to protect their offspring against the often highly aggressive males. There are also species in which care duties are shared by individuals other than the parents. These “helpers” can be relatives, offspring from a previous brood, or outsiders that are tolerated in exchange for their childcare duties, a form of cooperation known as “pay to stay” among researchers.

### The origins of milk

Comparative studies have shown that brood care as a strategy for efficient reproduction has evolved independently in a number of different groups of animals, the zoologist recounts. But is parental care something that can be compared across all species, from single-celled organisms to humans? “While it can take very different external forms, the fundamental challenges faced by parents are not so different.” Kölliker has a keen eye for mechanisms occurring within his own family, and finds it “comforting

to observe that human beings are a part of nature, and do not operate on an entirely different level to the other creatures on the planet.”

He concludes with a remarkable story about how milk is likely to have evolved: certain female insects, like earwigs for example, treat their eggs with antibiotic substances to protect them against bacteria and fungi. The very first mammals, around 200 million years ago, still laid eggs, and similarly coated them with a bodily secretion for protection. This substance is thought to be a precursor to mammalian milk. Rather than providing nutrition, its original function was to offer protection against harmful organisms – an antibiotic effect that milk still retains today. ■

Brood care is the topic of the special exhibition “Milk – maternal elixir” at the University of Zurich’s Zoological Museum (until 29 November 2020) and Haus der Museen, Olten (29 April to 29 October 2021).



A female earwig tends to her offspring.  
(Photo: Joël Meunier)



# Looking deep into the brain.

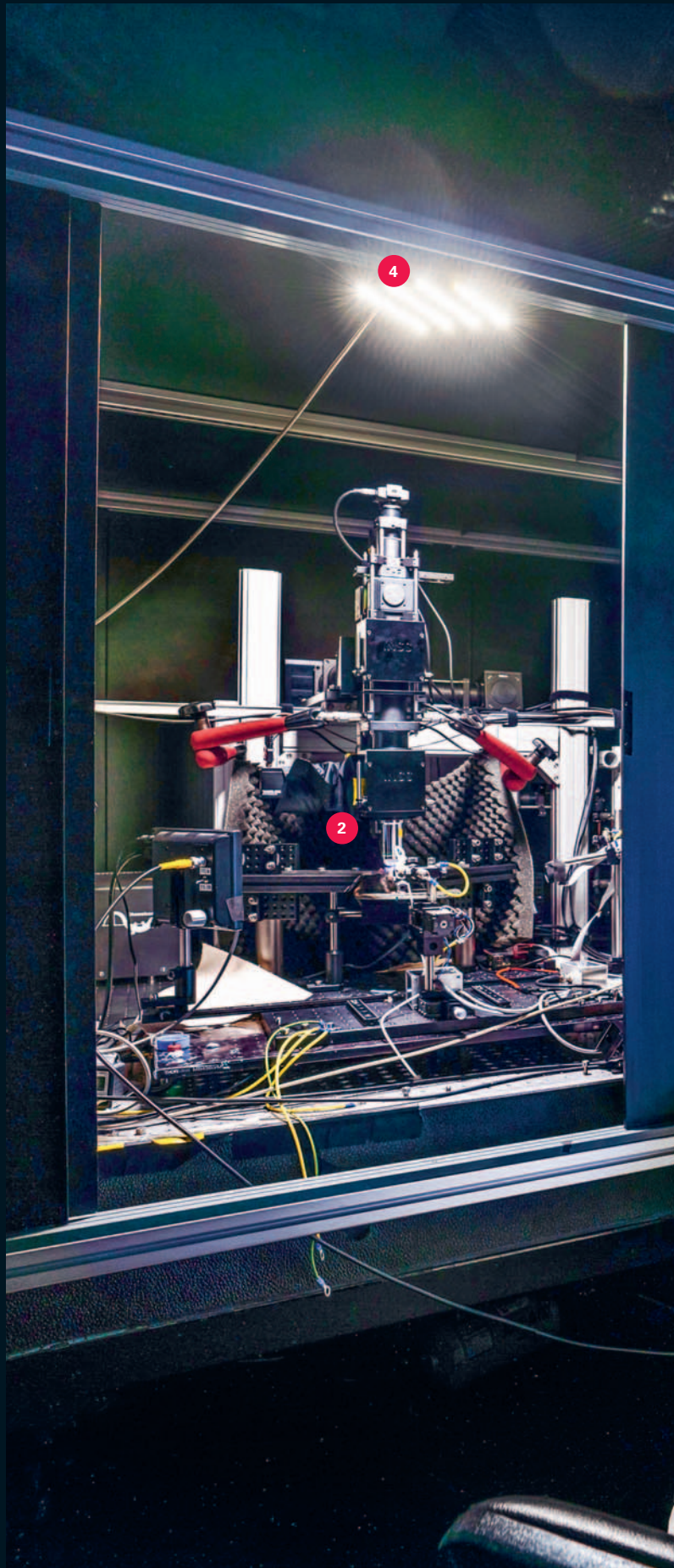
How do different sensory impressions come together in the brain? And how do they form the basis for learning and memory? Researchers at the Department of Biomedicine in Basel are attempting to answer these questions with the help of high-tech microscopes.

By examining the brains of mice, they can observe which neuronal circuits bring together and process the various sensory impressions. They also aim to gain a better understanding of sensory associations during learning and of hallucinations in people suffering from psychiatric disorders.

**Masashi Hasegawa** is a postdoc in Professor Jan Gründemann's research group at the Department of Biomedicine in Basel.

Photo:  
Philippe Wiget

- 1** Dr. Masashi Hasegawa uses what is known as a two-photon microscope to study brain cell activity in a mouse. In the experiment, the animal learns to recognize a specific combination of sensory stimuli in return for a reward.
- 2** In combination with gradient-index lenses, the high-resolution microscope allows researchers to look up to four millimeters into the brain. A highly focused infrared laser beam, which can penetrate deep into the tissue, excites sensor proteins in the brain cells and causes them to glow. When the nerve cell is activated, the luminosity of these sensor proteins changes.
- 3** The microscope's field of view takes in around 100 nerve cells. Thanks to the sensor proteins, the "firing" of neurons can be viewed under the microscope. Hasegawa can therefore make real-time observations to determine which brain circuits are active during the processing of sensory stimuli.
- 4** The experiments are usually conducted in total darkness to prevent external light from interfering with the highly sensitive microscope.









# The hidden carbon footprint of AI.

Is a legal framework needed to regulate energy-intensive artificial intelligence applications?

**D**evelopments in the realm of artificial intelligence (AI) are proceeding at an ever-faster pace. A technology that used to be restricted primarily to specialist fields has given rise to applications with the potential to radically transform our everyday life, such as voice recognition or self-driving vehicles. The flipside of these developments is steadily growing resource consumption. Training AI applications is a hugely energy-intensive process that is expected to become a key driver of global electricity consumption in the medium term. On the surface at least, this runs counter to the aspiration of many industrialized nations to scale back their demand for energy. Accordingly, some studies have recommended regulatory interventions, for instance mandatory efficiency standards or a requirement to power computing centers with energy from renewable sources.

However, it is important to ask ourselves first whether the energy use inherent to AI applications is really a problem. Interestingly, there is no firm evidence for this as yet: the diversity of AI applications and the complex behavioral changes they often trigger makes it difficult to assess their overall impact. Self-driving vehicles are a good example. On the one hand, this is a technology that requires intensive use of various AI applications involving extensive – and recurring – training. On the other hand, driverless vehicles have the potential to lower overall energy consumption in the mobility sector substantially: by eliminating the cost of a driver, public transport or cab journeys can be offered at lower prices. This makes car ownership less attractive, which in turn can lead to a significant reduction in energy and resource consumption in the vehicle manufacturing industry as fewer (but more efficiently utilized) vehicles are needed. Then again, we could also see a rise in demand for mobility services, so the technology's

overall effect on energy demand is difficult to predict. Other AI applications, meanwhile, such as tailored advertising in the marketing sector, offer far less – if any – potential for energy savings, and are therefore likely to contribute to an increase in energy consumption. Alongside the energy issue the social benefits of these applications must, however, also be taken into account.

In any case, there is no question that it makes sense to design the framework conditions governing AI applications in a way that encourages those applications with the greatest benefit to society on the one hand, while mitigating adverse effects such as increased energy consumption on the other. For the first aspect, it would be helpful if electricity prices would accurately reflect the real cost of producing a MWh of power, including the associated environmental damage. This would mean that the energy-intensive training of AI applications would only come into play for applications promising greater value. Still, realistic electricity prices remain a distant prospect in the vast majority of countries.

The second goal could be pursued by exploiting the fact that training AI applications is flexible, in terms of both time and space. The increasing use of renewa-

ble energy sources with fluctuating output means there are times during which a particular region produces more electricity than it consumes. Shifting energy-intensive applications such as AI training to times and places with excess electricity would probably render the additional consumption largely irrelevant. Many countries, however, lack sufficient incentives such as electricity pricing designed to counter regional shortages. Tweaking these framework conditions could result in stronger incentives and render concerns about the energy consumption of AI applications all but obsolete. ■



**Frank Krysiak**

is Professor of Environmental Economics at the University of Basel and head of the SCCER CREST energy research center.

He works primarily on the long-term effects of environmental and energy policy on technological progress.



**M**uch of the huge progress made by artificial intelligence (AI) can be attributed to machine-learning techniques, foremost among them the method known as deep learning. Deep learning is the process whereby a neural network is trained using a very large set of examples. In the case of speech recognition, for instance, these examples might take the form of an extensive corpus of recorded speech and the corresponding text. On an intuitive level, neural networks are inspired by the human brain: the training process either reinforces or weakens the connections between individual neurons. In other words, a neural network is a mathematical model with parameters that are adjusted by training so as to accurately reflect the examples provided. As a result of this training, in the application stage the system is able to process similar data with relatively low expenditure of time and energy: a smart speaker understands a spoken request to play a particular song, for example.

The amount of energy consumed during the training stage, however, is considerable, and a few years from now could make up a sizeable portion of global energy consumption. This sits awkwardly with the goal of significantly reducing carbon emissions in order to combat climate change. So is regulation the answer? Regulating just the use of AI would produce limited results for the reasons stated above. However, a more comprehensive regulatory approach would be difficult to implement, as the highly energy-intensive training stage occurs in computing centers that can be located almost anywhere in the world.

While the amount of energy consumed is virtually invisible to the end user, the companies involved have a very clear interest in minimizing their costs and using renewable energy sources for reputational reasons. Amazon and Google, for instance, already operate wind and solar farms to power their computing centers. Moreover, the high utilization rate of these

centers as a result of cloud computing improves their relative energy consumption. Nevertheless, it is vital beyond this to reduce this energy consumption. There are good reasons to hope that technological developments will themselves contribute in this regard, in particular with the emergence of increasingly energy-efficient learning algorithms and dedicated hardware. This topic has received growing attention in the scientific community in recent years. Researchers are currently exploring ways to measure and compare the environmental cost of algorithms, which will hopefully soon become a key criterion in the evaluation of new approaches alongside factors such as time expenditure and precision.

As regards hardware, development is undergoing a shift away from the graphics processors used in the past toward dedicated chips such as tensor processing units able to perform the same calculations faster, while consuming less energy. Yet, these approaches only target the energy use of AI applications themselves. At the same time, however, artificial intelligence is already contributing to energy savings in a host of other areas: for example, energy consumption in buildings can be dramatically reduced by taking into account information such as usage habits or weather forecasts. In the renewables sector, AI can help with energy availability forecasts and grid stabilization. In

general terms, many AI applications are geared toward more efficient use of resources, and are therefore likely to make a growing contribution to the goal of improving our carbon footprint. This benefit must be weighed up against the energy consumed by the technology itself. Overall, the savings brought about by artificial intelligence can be expected to outweigh their additional energy consumption by a significant margin. With this in mind, aside from the difficulty of implementing it, regulation might actually have a negative impact in terms of climate targets. ■



**Gabriele Röger**

is a postdoctoral researcher in the Artificial Intelligence research group at the Department of Mathematics and Computer Science. She deals primarily with automated planning and search in large state spaces.






Album

# Petrified water.

Photos: Christian Flierl  
Text: Angelika Jacobs



A photograph of two researchers in a cave. They are wearing yellow and red wetsuits and headlamps. The cave ceiling is covered in numerous stalagmites, some of which are dripping with water. The researchers are looking up at the cave ceiling. The lighting is dim, with the primary light source being the headlamps.

Thousands of years compacted into just a few centimeters of rock: stalagmites contain a valuable climate record that stretches back farther than tree rings or ice cores. Professor Dominik Fleitmann and his team collect samples from dripstone caves in various regions of the world, including the Middle East and North Africa, as well as in Switzerland. In the Milandre Cave in the Canton of Jura, the researchers have been measuring the drip rate and temperature for a number of years in order to incorporate this measurement data into their analyses.

The actual focus of their research, however, is on the interior of the stalagmites. By examining the layered deposits, they can reconstruct how precipitation and temperature levels have varied over the millennia. Like tree rings, these layers of what Fleitmann calls “petrified water” reflect the climatic and weather conditions at the time. In the future, he also wants to scour the deposits for traces of genetic material, which allows conclusions to be drawn about the community of soil organisms in the ground above the cave. This, he says, will offer additional insights into the prevailing environmental conditions.

Fleitmann is also fascinated by the influence of climate variations on the twists and turns of the past from a social and political perspective. With this in mind, he combines his data with archaeological finds and historical records. What influence did climate variations have on the emergence of the Silk Road or Islam, for example? And was there a historical precedent for the biblical Flood?







In consultation with the relevant authorities and associations, the researchers remove a core from one of the selected stalagmites. In the case of formations with a smaller diameter, it makes sense for them to take the entire stalagmite away with them (left).

Good equipment is invaluable, as the cave expeditions are a muddy affair. The carefully packaged core then travels back to the laboratory with the team.





Inside the boxes lie petrified climate records from all over the world. Some of the stalagmites in Fleitmann's collection contain layers that are several million years old.









At regular intervals, the researchers extract samples for chemical analysis. The thickness and composition of the layers reflect the environmental conditions in which they were formed.

A mass spectrometer provides details of the geochemical fingerprint of the rock samples and also allows precise dating using radioactive elements. Changes that took place in the local climate hundreds of millennia ago can therefore be pinpointed to a period of about a dozen years (right).







A large, detailed photograph of a stalagmite specimen from Yemen. The specimen is light brown and tan, with dark brown lines indicating the growth patterns. It features numerous circular holes of varying sizes, some of which are filled with dark material. The surface is textured with wavy, concentric layers and some linear features. The background is black.





**Dominik Fleitmann** has been Professor of Quaternary Geology since 2019 at the Department of Environmental Sciences, where he plans to establish a center for research into speleothems (the technical term for cave formations).

# Plants capture mercury from the air.

As a result of human activities, the amount of mercury in circulation is ever-increasing. To protect both health and the environment, it is important to understand the processes by which this pollutant spreads through soils, air and water – and in which plants appear to play a key role.

Text:  
Yvonne Vahlensieck

In the mid-1950s, the population of the coastal Japanese town of Minamata suddenly began developing unusual symptoms, including uncoordinated movements, paralysis and sight defects. Many thousands of people died of the mysterious disease. It wasn't until a few years later that the cause was found to be mercury poisoning. After entering the sea via wastewater from a chemical plant, the heavy metal had accumulated in a toxic form in the fish that served as the principal source of food for those affected.

This environmental disaster drew attention to the dangers posed by mercury when it accumulates in the food chain. Small children along with pregnant and breastfeeding mothers are particularly at risk, as mercury can interfere with the early stages of nervous system development.

## Releasing less mercury

The Minamata Convention on Mercury, which was approved in 2013, therefore aims to achieve a massive reduction in the release of mercury into the environment over the coming decades – for example, by calling for the introduction of alternative production methods in the chemical industry. After all, a substantial proportion of the mercury in the atmosphere – several thousand tonnes a year – is introduced by human activities, such as the production of plastics and cement, the operation of coal-fired power stations, and prospecting for gold. According to a UN report, human activities cause over four times as much mercury to be released into the atmosphere as that due to natural events such as volcanic eruptions.

“The big question now is whether the measures established by the Convention are effective,” says Dr. Martin Jiskra from the Department of Environmental Sciences of the University of Basel. According to Jiskra, it is essential that the measures reduce the mercury concentration not only in the air but also in the food chain. “But we can only make good predictions of this if we have good models of global mercury cycling.” The biogeochemist has researched the relevant processes for many years, thereby providing the basis for optimizing these models.

That is easier said than done, however, because mercury circulates between the air, land and water in a complex cycle, adopting various different forms in the process. When the heavy metal is first released by natural or human processes, it enters the atmosphere in its pure, elemental form. Some of the mercury then undergoes chemical reactions that convert it into a water-soluble form, which rain transports into the sea. Once there, microorganisms use it to produce what is known as methyl mercury – a biologically active, toxic form that progressively accumulates in fish and is responsible for the damage to health.

## Vegetation as a mercury pump

As Jiskra's research shows, however, one key component in this cycle has so far been neglected: the role of vegetation. In addition to CO<sub>2</sub>, plants also absorb pure mercury from the air via their stomata. Although the heavy metal has no biological function, the plants incorporate it into their leaves, which they then shed in fall. As the foliage decomposes, the mercury is returned to the soil and to surface waters.



“The plants therefore act as a sort of mercury pump,” says Jiskra. Around two-thirds of the mercury are removed from the atmosphere in this way, whereas only a third is removed in the water-soluble form by rainfall. “This deposition pathway was neglected in the past and completely changes the dynamics of current models.”

These new insights were only possible thanks to major advances in analytical methods in recent years. For example, mercury naturally occurs in different configurations, known as isotopes, which can be distinguished from one another based on their weight. “It’s like a fingerprint. As plants preferentially take up the lighter form, we can now track how much mercury is removed from the air by vegetation,” says Jiskra. To do this, the researcher analyses air samples collected at five measuring stations stretching from Finland to the Schauinsland near Freiburg, in the Black Forest. As the mercury is only present at an extremely low concentration (about one billionth of a gram per cubic meter of air), the material for the analysis must be collected and concentrated from six cubic meters of air using activated

carbon filters. Jiskra now wants to use this method to find out why the mercury concentration in our atmosphere is higher in winter than in summer: “The previous hypothesis was that power stations burned more coal for heating in winter, thereby releasing more mercury into the air.” However, initial measurements have shown that the seasonal variation is actually connected to the growing season: in summer, plants grow and therefore absorb more gas, reducing the proportion of light mercury isotopes in the air.

### Climate change has consequences

Accurate models are, however, not only needed to verify the effectiveness of the Minamata Convention on Mercury. There is another motivation for Jiskra’s research: “It’s vital that we determine how the global mercury cycle is affected by climate change and changes in land use. This aspect is still largely overlooked.” Vegetation also plays a significant role in Alaska, as Jiskra discovered while working as a post-doc there. Over the last few centuries, plants in the Arctic tundra have steadily absorbed mercury, which was then trapped in the ground by the permafrost. It has now become apparent that the frozen ground is thawing again and releasing large quantities of mercury, which then ends up in the sea. This has potentially serious consequences for the health of the regional population, for whom the Arctic Ocean provides the principal source of food.

In his latest project, Jiskra therefore wants to close more of the gaps in our knowledge of the mercury cycle: “In the past, measurements were primarily aimed the soil, whereas we now want to include all of the vegetation as well.” With this in mind, Jiskra and colleagues are adopting measuring techniques that were developed by climate researchers over recent years in order to study greenhouse gases, such as CO<sub>2</sub> and methane. A pilot system adapted to mercury has been set up in a meadow in the Canton of Zug and is already delivering promising results in real time. Several times a second, the device measures the direction and strength of the wind as well as the mercury concentration in the air.

In the future, the idea is to install the instrument securely above the treetops in order to provide information about how much mercury is absorbed by the forest. “We break the processes down into small pieces and then combine them into an overall picture, like a mosaic,” says Jiskra. “This allows us to understand the complex mercury cycle in its entirety, right through to the accumulation of mercury in fish.” ■



Harmful heavy metal:  
Measuring concentrations of mercury.  
(Photo: Frank Brüderli)

# Core components for energy-saving electronics.

Topological insulators are an entirely new class of materials boasting unique properties that make them promising candidates for energy-saving, high-performance electronics and quantum computers.

Text: Christine Möller

**S**martphones and computers are everywhere. Making calls, chatting, watching films, taking photos, recording videos, surfing the net or using fitness, health or entertainment apps – all of these activities require huge amounts of energy. And not just to power the billions of end devices, but also to run the servers that store the steadily growing streams of data they process.

Modern electronics rely on components made of silicon. Silicon is a semiconductor with electrical properties that can be modulated by deliberately introducing other atoms into its crystal structure – a process known as doping. However, the remaining optimization potential of silicon components is close to being exhausted. Accordingly, the search is on for new materials suited to the production of even more compact chips and transistors that are able to run on very little power while producing almost no heat. Topological insulators are a class of materials that meet these requirements, with the potential to usher in a major breakthrough in the performance and energy efficiency of present-day electronic devices.

## Insulating on the inside, conductive on the outside

Topological insulators are distinguished by a particular feature: whereas on the

inside they behave like insulators, meaning they do not conduct electricity, their edges exhibit metallic properties, making them electrically conductive. Accordingly, a three-dimensional crystal of a topological insulator only conducts electricity on its surface; currents cannot flow on the inside. Two-dimensional topological materials consisting of just a few atomic layers only conduct electricity at the edges. And in the case of a one-dimensional material – an atomically thin wire – only the charge carriers at each extremity can move. Another remarkable property of these materials is that the abovementioned regions conduct current almost losslessly: resistance is minimal, so virtually no heat is generated. This effect is caused by quantum mechanical phenomena. Consequently, using these materials in electronic components has the potential to deliver unprecedented efficiency by eliminating the energy losses associated with heat generation.

Moreover, one-dimensional topological insulators could function as ideal storage units for quantum information, which would allow them to play a crucial role in quantum computers. The charge-carrying points at each end of the atomically thin wire could potentially be defined as the two components of a quantum bit – the smallest unit of information in a quantum computer.

While topological insulators could be destined for great things, they are a relatively recent discovery. It was not until the 1980s that a team of physicists led by Professor Klaus von Klitzing observed that an extremely thin two-dimensional material subjected to a very strong magnetic field at low temperatures did not behave like a true insulator as expected. Instead, it turned out to be highly conductive – at the edges. What is more, the energy losses were minimal. The discovery of this phenomenon, dubbed the quantum Hall effect, earned Klaus von Klitzing a Nobel prize in 1985.

More recently, researchers have discovered that numerous other two-dimensional and three-dimensional crystals exhibit the same peculiar properties without the need for a magnetic field. Scientists at the University of Basel are among those researching these highly promising materials.

## Stacking potential

The research team led by Professor Christian Schönenberger, for instance, is searching for new topological insulators that possess particularly favorable properties for various applications. With the support of an Advanced Grant from the European Research Council (ERC), the group is investigating van der Waals heterostructures – stacks of two-dimensional crystals

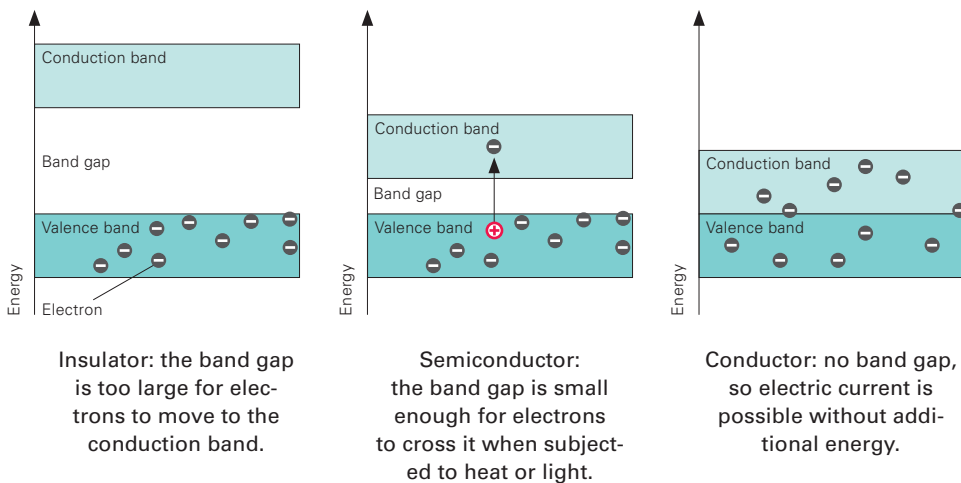
made up of individual atomic layers of different materials. These layers are held together by a form of attraction known as van der Waals forces. “We can now create new materials that do not occur in nature – simply by stacking two-dimensional crystals in the right way. These crystals can exhibit entirely novel properties, in some cases becoming topological insulators,” explains Christian Schöninger.

Another team led by Professor Dominik Zumbühl has developed a method allowing them to investigate the narrowly limited conductive regions of the materials. Using a technique called tunneling spectroscopy, the researchers have already succeeded in obtaining an exact “fingerprint” of these conductive regions in nano-

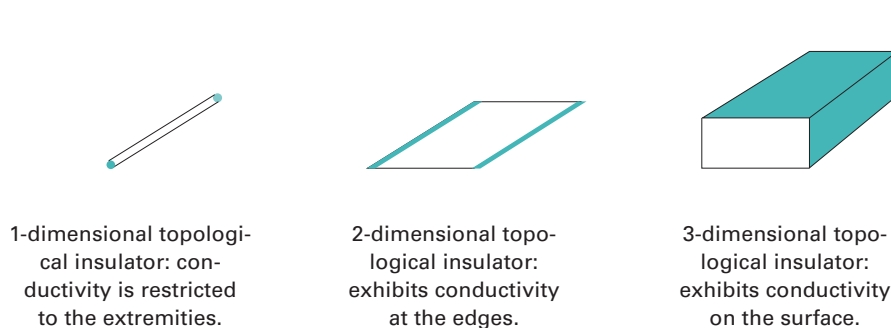
meter resolution. They predict that the method will also lend itself to highly detailed examination of topological insulators. This could help to gain even more detailed insights into the properties of these materials, and help pave the way for practical applications. By conducting measurements on bismuth telluride, one of the first confirmed topological insulators, the group led by Professor Ernst Meyer recently succeeded in proving for the first time the theoretical assumption that resistance results in significantly lower heat generation than that caused by a comparable electrical current in conventional conductors. “Besides the low energy losses in the form of heat, we were also able to describe a novel quantum mechanism that we can use to control the

resistance with a high degree of precision,” Meyer explained. “Just as a vehicle relies on resistance to start moving, accelerate or brake, it is sometimes desirable at the nanoscale, too. For potential applications, the ability to control this factor is crucial.”

There are still numerous unresolved issues for the scientific community to address before topological insulators can complement or replace present-day silicon components. In the coming years, we can expect to gain numerous new insights into this young class of materials that will bring them closer to the application stage – potentially even as components in a powerful quantum computer. ■



The band model illustrates the energy states of electrons in a solid and the conductivity of different materials. It describes the energy required (band gap) to excite an electron from its fixed position in the valence band to the conduction band, where it can move freely – a prerequisite for electric current.



A one-dimensional topological insulator – a wire consisting of a row of atoms – only conducts current at the two extremities. A two-dimensional topological insulator with just a few atomic layers is only conductive at the edges, and a three-dimensional crystal of a topological insulator only conducts electricity on its surface. On the inside, these materials behave as insulators.



# Smart molecules heal wounds.

When a serious injury occurs, bleeding can overwhelm the body's healing mechanisms. Artificial molecules could help by giving a boost to the clotting process.

Text:  
Angelika Jacobs

**A**n accident victim is bleeding heavily. Emergency medics need to act fast. The human body is well-equipped to deal with minor injuries thanks to the process of clotting, an ingenious system for closing wounds. However, if the bleeding is too heavy, the body is simply unable to deliver sufficient coagulation factors to the crucial spot, preventing it from forming a clot and stemming the hemorrhage. In emergencies, medical staff can help the process along by administering coagulation factors isolated from donated blood. "However, substances of this sort are expensive to isolate, have a short shelf life and do not work very efficiently," says Michael Nash.

**"This will be the key to developing targeted therapies that act only where they are needed."**

Michael Nash

The Professor of Molecular Engineering and his team are developing smart molecules that can interact with the body's own clotting mechanism. The goal is to reinforce the resulting clot so as to close the wound more quickly and effectively – not just in the treatment of major injuries, but also for patients with hereditary coagulation disorders or in cases where clotting is hindered by anticoagulant medications.

## Platelets and fiber mesh

When a wound bleeds, a change occurs in the blood flow. This mechanical stimulus acts as a signal for platelets to assemble at the site of the injury. The platelets in turn release a messenger substance that prompts the formation of a mesh of fibrin strands. Together, the platelets and the fibrin mesh form the clot that seals the wound. "This clot has some interesting mechanical properties: the more tension it is subjected to, the more rigid it becomes," Nash explains. This is in contrast to the everyday observation that an elastic object, such as a tension spring, loses its structure when subjected to excessive strain: if a tension spring is irreversibly damaged in this way, it loses its elasticity and can no longer pull together or extend. Blood clots, on the other hand, actually become more stable the greater the pressure exerted on them by the bloodstream.

Nash and his team hope to further reinforce these particular properties. To this end, they are working with macromolecules consisting of elastic protein chains, known as "elastin-like polypeptides" (ELPs). In a project funded by the European Research Council (ERC), Nash's team tweaked ELPs so as to

allow them to be recognized by the body's clotting factors at the wound site and incorporated into the fibrin mesh.

### Like oil in water

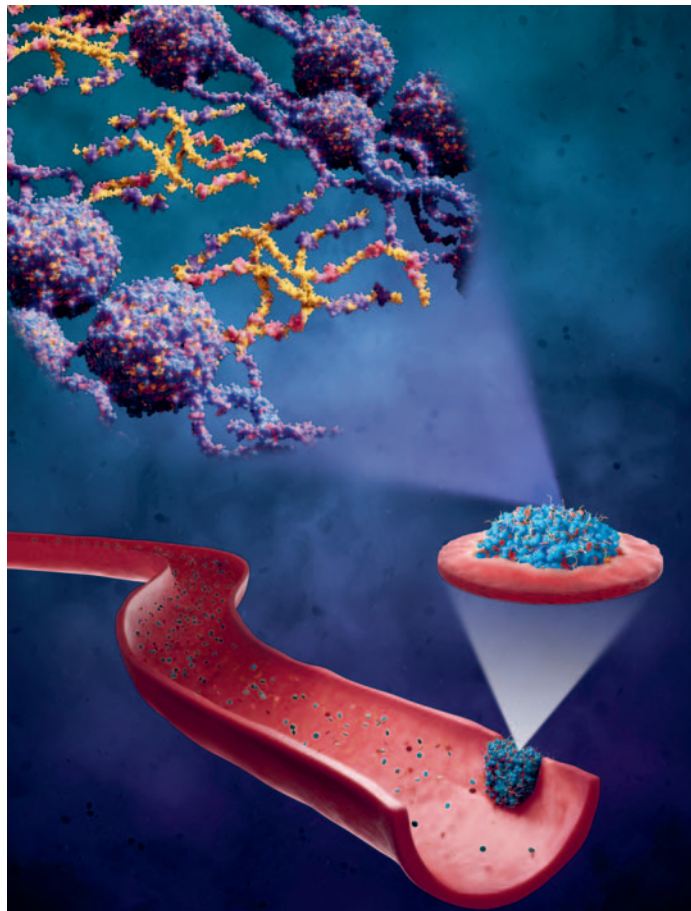
That is not all, however: thanks to an additional trick, the molecules offer a further boost to the clotting process. The ELPs are designed in such a way that their properties change above a certain temperature threshold. At room temperature they are water-soluble, making them easy to store for later use. However, when exposed to the body's internal temperature of around 37 degrees, they become hydrophobic: like oil in water, which gathers in droplets, the ELPs come together to form nanoparticles, allowing them to circulate in the bloodstream for longer and remain stable. Moreover, this high concentration of ELPs in nanoparticles reinforces their chemical bond with the fibrin strands.

In laboratory tests, Nash and his colleagues observed that these special properties of designer molecules gave rise to clots with thinner but more compact and stiffer meshwork, and therefore more stable. Moreover, these modified clots take longer to be broken down by enzymes in the body, which could favor the healing process in certain cases. The development has already been patented, and preclinical trials with laboratory animals are planned.

### Mechanical feelers

The team's research and development work on blood clotting is part of a wider topic: the stability of macromolecules, which are increasingly widely used in medicine, above all in the form of antibodies and enzymes. Besides designing macromolecules with potential therapeutic applications, the team is also researching natural phenomena that could serve as inspiration for the properties of these novel molecules. They are especially interested in reactions to mechanical stimuli, such as the signal that triggers the clotting process. "Very little research has been done into just how proteins perceive and process mechanical stimuli," says Nash.

For example, in the world of proteins there are mechanisms whereby a protein under tension is able to cling harder to an object it binds to. The research team in Basel recently described a mechanism of this sort in gut bacteria, which were able to keep their hold on cellulose fibers in spite of the powerful shear forces at work in the digestive tract. Tricks of nature like this one could potentially be exploited in biopharmaceuticals, for instance allowing them to react to mechanical stimuli and change



Specially designed macromolecules reinforce the blood clot by being integrated into the mesh of fibrin strands. (Illustration: University of Basel, Department of Chemistry.)

their behavior accordingly. A potential application of these properties might consist in enabling nanoparticles to lodge themselves in tumors without being washed away by the flow of blood, for example. "Engineering biomolecules to adhere specifically to certain structures, tissues or cells: this will be the key to developing targeted therapies that act only where they are needed but spare the rest of the organism," concludes Nash. "We are excited about where our approach will take us." ■



## Economics

## Lottery ticket boosts motivation to donate blood.

Donating blood is a matter of life and death, and the medical sector depends on a broad base of healthy donors. In Switzerland, donation is voluntary and mainly driven by the desire to help others. This system has worked well up to now, aside from a seasonal shortage in the summer. However, demand for donor blood is rising as new surgical techniques and modern cancer treatments are developed. At the same time, more stringent conditions – such as stricter travel rules for donors – are leading to a decline in donations.

So how can more people be encouraged to donate blood? Many economic models are based on the assumption that targeted rewards increase willingness. Skeptics, however, fear that material rewards could undermine altruistic motives. Professor Alois Stutzer (Faculty of Business and Economics, University of Basel) and Professor Lorenz Goette (University of Bonn) have conducted a study of over 10,000 people who give blood on a more-or-less regular basis. They investigated whether the prospect of a lottery ticket or a free cholesterol test influenced the rate of donation. The study showed that a temporary reward did not have a negative impact on donor motivation once the offer was withdrawn. In fact, lottery tickets increased the donation rate by 5.6 percentage points – in particular, encouraging less motivated donors to give blood more frequently. ■

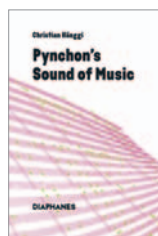
## Political science

## The revolving door effect.

When Gerhard Schröder stepped down as German Chancellor, he became CEO of Nord Stream 2. Experts refer to this rapid transition between politics and business as the “revolving door effect”. When politicians pursue lucrative careers in business after leaving office, it often causes discontent among the public. The revolving door effect is criticized for preserving and strengthening the social balance of power.

Clint Claessen, Professor Stefanie Bailer and Dr. Tomas Turner-Zwinkels from the Department of Politics at the University of Basel have conducted a study into the frequency of the revolving door effect. They analyzed the careers of 1,351 German and Dutch politicians who left office after 1986. The results show that the majority did not use their political service as a springboard for a career in the business field. After stepping down, just 32 percent of these parliamentarians worked in roles with a better salary or higher status. The results, however, also show gender-specific differences between the people studied, regardless of their education and socioeconomic status. Around 36 percent of male politicians were recruited to more attractive jobs, compared with just 24 percent of the women. The study therefore shows that launching a business career may be more difficult for female politicians. ■





### Musical Literature

#### Where the legible meets the audible.

American novelist Thomas Pynchon is well-known for his commitment to audition – the acts of hearing and of listening. This book is the first monograph that is dedicated to cataloging, exploring and interpreting the manifold manifestations of music in his work. A mix of close and distant readings, it employs a variety of disciplines – from literary studies and musicology to philosophy, media theory, and history – to explain Pynchon through music and music through Pynchon.

Encyclopedic and eclectic in its approach, the book discusses the author's use of instruments such as the kazoo, the harmonica or the saxophone and embarks on close readings of the most salient and musicologically tantalizing passages. Zooming out to a bird's eye view, all his historical musical references and allusions are put into perspective to trace the trends and tendencies in the development of Pynchon's interest in music in his oeuvre.

A treasure trove for fans and a source for future scholarship, this book includes the Pynchon Playlist, a 900+ item catalog of all musical references, and an exhaustive index of more than 700 appearances of musical instruments. ■

Christian Hänggi  
Pynchon's Sound of Music  
Diaphanes, Zurich 2020  
320 pages, CHF 40.00



### Psychology

#### Countering fake news.

This volume examines the phenomenon of fake news by bringing together leading experts from different fields within psychology and related areas, and explores what has become a prominent feature of public discourse since the first Brexit referendum and the 2016 US election campaign.

Dealing with misinformation is important in many areas of daily life, including politics, the marketplace, health communication, journalism, education and science. In a general climate where facts and misinformation blur, and are intentionally blurred, this book asks what determines whether people accept and share (mis-) information, and what can be done to counter misinformation? All three of these aspects need to be understood in the context of online social networks, which have fundamentally changed the way information is produced, consumed and transmitted.

Also providing guidance on how to handle misinformation in an age of "alternative facts", this is a fascinating and vital reading for students and academics in psychology, communication and political science and for professionals including policy makers and journalists. ■

Rainer Greifeneder, Mariela Jaffe,  
Eryn Newman, Norbert Schwarz:  
The Psychology of Fake News.  
Accepting, Sharing, and Correcting  
Misinformation  
Routledge, London 2020  
252 pages, GBP 34.99



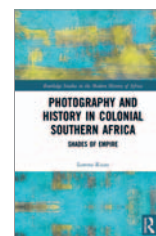
### Innovative Financing

#### Cryptocurrencies and blockchain technology.

Bitcoin and blockchain enable the ownership of virtual property without the need for a central authority. Additionally, Bitcoin and other cryptocurrencies make up an entirely new class of assets that have the potential to enact fundamental change in the current financial system. This book offers an introduction to cryptocurrencies and blockchain technology that begins from the perspective of monetary economics.

The authors first present a nontechnical discussion of monetary theory, enabling readers to understand how cryptocurrencies are a radical departure from existing monetary instruments, and provides an overview of blockchain technology and the Bitcoin system. They then take up technical aspects of Bitcoin in more detail, covering such topics as the Bitcoin network, its communications protocol, the mathematics underpinning decentralized validation, transaction types, the data structure of blocks, the proof-of-work consensus mechanism and game theory. ■

Fabian Schär and  
Aleksander Berentsen: Bitcoin,  
Blockchain, and Cryptoassets.  
A Comprehensive Introduction  
MIT Press, Cambridge 2020  
288 pages, USD 50.00



### African Studies

#### Photographs as a means of historical reconstruction.

This book studies the relationship between photography and history in colonial Southern Africa, using a series of encounters with Southern African photographic archives to reflect on photography as a distinct historical form.

Through the use of private and public archives, images produced by African itinerant photographers, white settlers and colonial state institutions, this study explores the relationship between photography and history in colonial Southern Africa. In so doing, the author highlights the ways in which photographic images cut across conventional institutional boundaries and complicate rigid distinctions between the private and the public, the political and the aesthetic, the colonial and the vernacular or the subject and the object.

The author argues that rather than understanding photographs as a means of preserving and recreating the past in the present, we can value them for how they evoke at once the need for and the limits of historical reconstruction. ■

Lorena Rizzo  
Photography and History in  
Colonial Southern Africa  
Routledge, London 2020  
278 pages, GBP 40.49



# The ghost in the machine.

How high-risk industries are sustained by a culture of safety.

Text: Markus Schöbel



**Markus Schöbel** is a senior lecturer in organizational psychology at the Department of Psychology. His research interests include safety culture and management and learning in organizations.

**H**ighly specialized organizations in the nuclear and chemical industries, civil aviation or the railway sector are inherently at risk of causing massive damage to themselves, people or the environment. Conversely, these organizations guarantee an extremely high level of safety on a daily basis by recourse to highly standardized technological and operational procedures. As a result, they are sometimes referred to as machine organizations. These intricate webs consisting of technological systems, the people that work with them and the organizations that coordinate and regulate the interplay between them are subject to the influence of another important but often overlooked factor: safety culture.

Safety culture first came into the spotlight in 1986 in the months following the Chernobyl reactor meltdown. Experts from the International Atomic Energy Agency (IAEA) identified a defective safety culture as one of the primary causes of the catastrophe. The concept of a safety culture served to encapsulate the broad spectrum of lapses and breaches observed, thereby expressing the collective failure at all levels of the organization (and the respective supervisory authorities). Five years later, the IAEA published its INSAG-4 report, which provided the first official definition of “safety culture” in terms of its essential requirements, describing it as: “that assembly of characteristics and attitudes in organizations and individuals which establishes that, as an overriding priority, [...] safety issues receive the attention warranted by their significance.” Among the features

highlighted in the report was the need for a questioning attitude on the part of the organization’s members and the provision of appropriate safety resources by its management, for example.

To this day, reports on inquiries into industrial catastrophes regularly cite failures at the level of safety culture. Aside from the often gradual decline of safety conditions over time observed at accident sites, such as defective alarm systems, inconsistent regulations or breach of established procedures, these failures increasingly include contributing factors that are further removed in terms of both time and space, such as the ignorance of top-level management in regard to warning signals (refinery explosion in Texas City, 2005), time and budgetary constraints affecting the launch of new technologies (Lion-Air Boeing 737-8 (MAX) crash, 2018) or failed state oversight (reactor meltdown in Fukushima Daiichi, 2011).

Today, high-risk industries acknowledge the importance of optimizing their safety culture almost without exception, and have implemented control mechanisms to this end. The prevailing view is that the *cultural contribution* above and beyond technological aspects is elementary and indispensable to the safety of systems, as these systems are ultimately invented, developed, built, serviced and maintained by people. Unlike technological components, people reflect on their actions, adjust them according to the situation at hand and communicate with one another while collaborating. The spirit of a safety culture can be observed in an organization’s policies, process descriptions and brochures. It usually includes the allo-

cation of certain responsibilities to particular functions or individuals, systems for reporting and assessment of incidents, targets in the sense of a learning culture, and processes such as the development of management staff. It is promoted in training programs, measured using indicators and assessed through document analyses, interviews and site inspections (conducted in the course of reviews). Safety culture is one of the few concepts rooted in the social sciences to have become established in the everyday operations of these predominantly technology-based organizations. Its positive and indispensable contribution to system safety is a matter of general consensus.

Scientific research into safety culture, by contrast, has struggled to gain momentum, held back by concerns over the appropriate theoretical framework, the methods to be employed and the resulting practical implications. A general starting point that has become established in expert circles is the model developed by US organizational researcher Ed Schein, which pinpoints an organization's culture primarily in the "taken-for-granted and shared assumptions" of its members. These assumptions are learned and internalized, specifically in the course of successful adaptation to external circumstances (e.g., "How should we interact with each other in the supervisory process?") and necessary integration into existing social structures (e.g., "Who is in charge here, and is it acceptable to criticize them?"). According to this understanding, positively changing a safety culture involves exposing, scrutinizing and questioning assumptions and procedures that are thought of as taken-for-granted (because they work). Unfortunately, critical questioning of this sort tends to be most vigorous precisely when a safety culture has failed. This timing is unfortunate, however, particularly if the organization is to learn from the failure.

Depending on the severity of the consequences, there is often a focus on individual blame, even though this is generally not conducive to improving a safety culture, and can even have destabilizing effects such as an erosion of trust in management or a feeling of alienation from one's work as a result of excessive new safety regulations. Moreover, this kind of retrospective analysis of accidents focuses chiefly on deviations from target outcomes, in order to determine precisely what those involved did wrong or failed to do, whereas a proactive understanding of culture also involves knowing what steps were taken by those involved and why they thought it was a good idea to behave in this particular way.

And this is where the key to a better understanding of safety culture is to be found: in the supposedly taken-for-granted assumptions that account for the success – or indeed the "safe operation" – of an organization. This also includes the not uncommon but largely disregarded episodes in which individuals averted a system's collapse with their expertise, courage and independence. The kind of safety culture that encourages these skills has already been described on a theoretical level in numerous models and guidelines. Further practice-oriented research is needed to identify the most effective ways for organizations to implement this knowledge. It is also clear that safety culture in today's organizations is more subject than ever to changing global, digital and economic framework conditions, making this spirit all the more worthy of protection in the future. ■

**“Critical questioning of this sort tends to be most vigorous precisely when a safety culture has failed.”**

**Markus Schöbel**



# Not a trace of coronavirus fatigue.

Text: Irène Dietschi Photo: Andreas Zimmermann

In late March, Matthias Egger, President of the National Research Council of the Swiss National Science Foundation, was busy staffing the “Swiss National Covid-19 Science Task Force.” This presented him with a number of quandaries, including who to put in charge of the Expert Group on Infection Prevention and Control. “The candidates to choose from were undoubtedly highly qualified experts,” says Egger, “but they were all older men.” Instead, he set about finding someone full of energy, “an individual who would look at the situation with a fresh pair of eyes.” So, as the chair of the task force at the time, he didn’t hesitate for a moment when two heavyweights of Swiss academia recommended the young infectious disease specialist Sarah Tschudin Sutter, Professor of Epidemiology in Infectious Diseases at the University of Basel and a senior physician at University Hospital Basel. “I didn’t know Sarah Tschudin Sutter, but I gave her a call immediately,” says Egger.

It’s a Friday morning in early September when I visit Sarah Tschudin Sutter in her office at the Department of Infectious Diseases at University Hospital Basel, and we’re both wearing face masks. She still has a busy day of meetings and organizational tasks ahead of her, especially when it comes to her work as a consultant: Tschudin Sutter is tasked with pulling all the necessary strings to ensure that every role is filled and patients with infections are well looked after. She has had to reduce her own clinical activities significantly, given her extensive responsibilities in relation to Covid-19. Matthias Egger’s phone call in late March still sticks out in her mind. “Everything happened so fast,” she says, her coffee still untouched

on the desk in front of her. “He asked if I was interested in leading the Expert Group. I said yes and sent him some details of my qualifications – and then boom, I found myself right in the midst of the action. The first video conference was held the next evening.” Since then, she has tried to give her best to the role. Egger gave up his mandate at the Task Force in July. Looking back, he says: “She was an extremely lucky choice.”

Sarah Tschudin Sutter, a petite woman of 44, is wearing her blond hair tied up in a knot. If you didn’t know better, you might mistake her for a student, but she is a tenacious and respected professor who frequently puts in 100-hour weeks. Manuel Battegay, head of her department and Professor of Internal Medicine and Infectious Diseases, is constantly impressed by the intensity and efficiency of Tschudin Sutter’s work: “She has the characteristics of a leader,” he says. Apparently, of the 500 residents he has supervised over the decades, she is one of the best.

## Then came the career

By her own admission, she wasn’t originally striving for an academic career. “During my studies,” she says, “my only aim was to become a good, clinically active physician specializing in infectious diseases and internal medicine. I hadn’t thought any further than that.” Then, you could almost say that her career found her: during her specialist training at University Hospital Basel, she realized how much she enjoyed infectiology and interdisciplinary work, including in the intensive care unit, where she primarily looked after patients with complex infections. She discovered the joys of scientific work

and began to research multidrug-resistant pathogens and the way they spread inside hospitals. After becoming the head of a research group at the University of Basel in 2015 and receiving a professorship in 2018, she realized she had a flair for hospital epidemiology. “Unlike clinical work, which is obviously very patient-centric, it’s more about organizational strategies and measures to prevent germs from spreading.” Tschudin Sutter has published several studies on the subject, which have also made their way into practice.

Over the last few months, however, she has of course been forced to scale back her research activities in order to turn her attention to the all-consuming issue of the day: Covid-19. What has been her experience of recent developments? She removes her face mask for a moment to take a sip of her coffee, which has by now probably gone cold. It’s been incredible, she says – “more intense and fast-paced than anything I’ve ever experienced before.” The early days of the pandemic were particularly challenging: with the situation developing rapidly and shocking reports emerging from northern Italy, case numbers were also rising in Ticino. Eventually, the first coronavirus patients were also admitted to the University Hospital in Basel. “We worked tirelessly to prepare the hospital to cope with a surge of patients. At the same time, we were looking at the pictures coming out of Bergamo and asking ourselves: What if we’re hit just as badly? How on earth will we cope?”

Her thoughts often turn to those days in February and March, but the difficult moments are also interspersed with many pleasant memories that have stuck in her



She was a rising star at the Department of Infectious Diseases, but when the coronavirus arrived, she faced her greatest challenge yet. She handled it brilliantly.

### Sarah Tschudin Sutter

was born in Basel in 1976. She is Professor of Epidemiology in Infectious Diseases at the University of Basel and a research group leader at the Department of Infectious Diseases and Hospital Epidemiology at University Hospital Basel, where she also completed her specialist training. From 2011 to 2013, she was a postdoc at the Johns Hopkins Hospital in Baltimore (USA) and obtained a master of science from the Bloomberg School of Public Health.

mind: the solidarity expressed at the hospital, the close interaction with people she wouldn't otherwise have met, the novel experience of communicating via digital platforms, the pooling of research findings from all corners of the world. Not to mention the quick coffee breaks with her husband, who is a neurologist and intensive care physician working as a senior consultant at the ICU. "We both work long hours," says Tschudin Sutter, "so it's nice if we're able to cross paths now and then."

Following a breather over summer, the University Hospital is now preparing itself for the colder time of year. Coronaviruses can spread more rapidly in lower temperatures, as can the viruses responsible for influenza and other respiratory diseases. "The challenge is that the symptoms are very hard to distinguish from one another," says Tschudin Sutter. Moreover, the way that the various pathogens interact inside the body is yet to be fully clarified – for example, one question is whether it is possible to develop Covid-19 and flu at the same time. "What should our approach be to diagnosis? What should our approach be to hospital epidemiology? These are the plans we're currently working on, and we're drawing up a range of different scenarios."

As the interview draws to a close, I ask her if it's hard to cope with this level of uncertainty. The infectiologist laughs. "You just have to get stuck in and put plans in place," she says – in the knowledge that things may well turn out differently. ■



Alumni at work: Barbara Piatti

# Between literature and geography.

Interview: Bettina Volz-Tobler

**Dr. Barbara Piatti mediates between academia and the public. She manages and develops interdisciplinary and cultural history projects, creating formats ranging from books to digital portals, festivals to audio dramas and staged walks – both on her own initiative and on behalf of official bodies, institutions and businesses.**



Barbara Piatti

**UNI NOVA:** Dr. Piatti, you studied German, philosophy and art history at the University of Basel and have become a versatile cultural mediator. What were your most important takeaways from your studies?

**BARBARA PIATTI:** Independence: finding niches, trusting in my own ideas rather than constantly following “trends”. Some people in my field were skeptical when I decided to focus on literary geography in my studies and my doctoral dissertation.

It seemed a somewhat esoteric topic that always had to be explained. Today, literary geography is established in the German-speaking regions, too. There are even reference books and textbooks.

**UNI NOVA:** What is the central idea that connects all your projects and activities?

**PIATTI:** Telling the best stories possible! As an author, I often grant myself the freedom to invent, to set the scene – following detailed background research, of course, and imagining how things might have been. I’m fascinated by the semi-fictional.

**UNI NOVA:** In a way, you feel at home in all media that promote culture and history education, and are also involved in various e-projects, such as a walk through the town of Laufen that almost feels like an audio drama. How did this project come about?

**PIATTI:** The idea came from the Emil and Rosa Richterich-Beck Foundation, who wanted to present Laufen, which is located by the River Birs, – as a historical echo chamber: I was commissioned to develop ten characters and make them “speak” – from a Neolithic Age woman to a medieval builder, a 17th-century merce-

nary and a market vendor in the interwar period. Character portraits are displayed on house walls and the audio dramas can be accessed via QR codes. I created something similar for Pfeffingen Castle together with Reto Marti, who runs “Archäologie Baselland” – the eight listening stations were opened in September and include impressive graphics.

**UNI NOVA:** What projects have you got planned next?

**PIATTI:** A large non-fiction book about the Alps for children, which I am writing together with Thomas Streifeneder, an economic geographer from Eurac Research in South Tyrol. We are also collaborating on a research project entitled “Rural Criticism”, in which we focus on the rapid transformation processes in rural areas and examine how these are portrayed and interpreted by literature. Then I have another book project on the cultural history of cooperative living spanning around 100 years. This will zoom in on people’s everyday lives, so it will also be highly narrative. And for 2021/22, we – that is the “Celestino Piatti – The Visual Legacy” association – are planning books and events to mark the 100th birthday of my father, who was an internationally renowned graphic artist and illustrator. ■

[barbara-piatti.ch](http://barbara-piatti.ch)

Alumni Prize

# Signs of increasing appeal.

Text: Bettina Volz,  
director of Alumni-  
Basel.

**The Alumni Prize was launched in 2015, the 10th anniversary of AlumniBasel. It is endowed with a CHF 10,000 prize by an alumnus and patron and aims to show the many ways in which University of Basel alumni go on to enrich society after completing their studies.**

**W**hen AlumniBasel was set up in 2005 by the President's Office and Senate, the topic of alumni was relatively unknown in Switzerland – in contrast to Anglo-Saxon areas, where organizations for former students have been an integral part of universities for over 100 years. Would this work in Switzerland, where the higher education system has a completely different structure? The idea of following Harvard's example and tapping wealthy alumni to fill the university's coffers was extremely enticing but – as quickly became clear – nothing but a pipe dream. Admittedly, AlumniBasel didn't get off to an easy start. Initial attempts to arrange large, cross-faculty events like the successes of ETH Zurich (Homecoming Day) and the University of St. Gallen (Alumni Ball) turned out to be hasty. The event programs may have been attractive, but in a city like Basel with a disproportionate number of events for its size, attendance simply wasn't good enough.

## Starting small

Smaller events did prove successful, such as the general assembly and the increasingly popular fall event, which focuses on university policy issues and has been held since 2010 in collaboration with the Frei-

willige Akademische Gesellschaft (FAG) and the Förderverein Universität Basel. These occasions have allowed alumni to slowly but surely make themselves known and increase their visibility.

Yet AlumniBasel still lacked a glamorous event to show how important alumni can be for the University of Basel. The idea of an Alumni Prize was developed to boost its profile and raise awareness. This was to be presented during the Dies academicus, the University of Basel's biggest annual celebration. Here too, various obstacles had to be overcome. After taking office as President in 2015, Professor Andrea Schenker-Wicki allowed the first Alumni Prize to be awarded at the Dies academicus, and for that we thank her. The five alumni who have received the prize in the intervening years show that the University of Basel can certainly hold its own in the top academic leagues. They have made a far-reaching impact in a wide variety of fields and have helped the University of Basel to national and international acclaim. The Alumni Prize is a way of promoting their achievements.

## Education and loyalty

AlumniBasel membership has increased significantly since 2005 and there are currently around 6,000 active members. The growth of the specialist alumni groups ("Fachalumni") is particularly pleasing. Now numbering 14, these groups have been consistently founded by younger alumni who get involved for two main reasons: they recognize the value of networks and wish to express their pride as University of Basel alumni. The new specialist alumni groups are actively supported by the teaching staff, establishing a much more intensive connection between alumni, students and lecturers.

And so we come full circle, culminating in the Alumni Prize: the education students enjoy, the loyalty they develop – and the fact that graduates are viewed positively and seen as relevant in the university's social environment – encourage alumni to actively identify with the University of Basel. ■

[alumnibasel.ch/de/netzwerk/alumni-preis](http://alumnibasel.ch/de/netzwerk/alumni-preis)



Alumni travels

## A fascination with the sea.

Anyone who studies biology at the University of Basel will be well aware of the marine biology excursion to Erquy, on the Atlantic coast of Brittany. In May 2021, AlumniBasel will organize a similar trip, led by Dr. Thomas Jermann, who has spent years exploring the area with students – besides publishing the book *Etudes Marines* with the small publishing house Du & Ich in Basel. For over 30 years, the marine biologist has photographed the intertidal zone – the magical area between sea and land (cf. UNI NOVA 128, November 2016). ■

Microworlds

## Special issue stamps by a Basel alumnus.



Copyright Post CH AG

In March 2020, molecular biologist Dr. Martin Oeggerli, a University of Basel alumnus, created two special issue stamps for Swiss Post. Oeggerli uses a scanning electron microscope to photograph minuscule scenes from the natural world, before lovingly coloring the black and white originals in exquisite detail. The results of his labors are precise, colorful and large-format depictions of an exotic and largely unknown micro-world that are published in prestigious journals and exhibited internationally. The one-franc special issue stamp shows a rose petal, while the second stamp, worth 85 rappen, features minute pollen grains of the forget-me-not.

Oeggerli studied at the University of Basel from 1994 to 2000, and went on to earn a doctorate in molecular biology in 2005. He has since made a name for himself with his striking illustrations of scientific phenomena, published under the pseudonym Micronaut. “It was only when I realized that they were to be found on the scale of bacteria that I was able to image the smallest pollen grains in the world,” says the researcher, artist and recipient of numerous awards. ■

Start-up

## Artidis on the road to success.

Alumnus Tobias Appenzeller, who studied nanoscience at the University of Basel, is the founder and current president of the alumni association Nano. Professionally, he is employed as Head of Quality and Clinical Operations at the start-up Artidis, which he also co-founded. The company recently announced the successful completion of the clinical study “Nano”, assessing the usefulness and sensitivity of a nanomechanical biomarker it developed for breast cancer diagnosis. The study was carried out at the Breast Center of University Hospital Basel and Basel University’s Biozentrum.

The Basel-based health tech company developed the first nanomechanical biomarker for cancer diagnosis and therapy optimization. The Artidis nanotechnology platform combines biomechanical data with other clinical parameters in the Artidis-Net platform, allowing the creation of a personalized prognosis for the disease’s progression, shortening the delay between biopsy and diagnosis to just a few hours. ■

AlumniActuarialScience

## Honorary membership for Herbert Lüthy.

As a sign of gratitude and in recognition of his achievements, AlumniActuarialScience made Professor Herbert Lüthy an honorary member of the association at this year’s reunion. For many years, Lüthy was a highly influential figure in Switzerland’s insurance industry. After holding management positions at Basler Versicherungen and Swiss Re, he served as director of the Federal Office of Private Insurance. In a short time, he established a stable and enduring framework for Swiss insurance companies in the form of the revised Insurance Supervision Act and the Swiss Solvency Test. Alongside his professional career, Lüthy taught at the Actuarial Department of the University of Basel’s Institute of Mathematics from 1989 to 2012. Above and beyond his teaching obligations, he worked tirelessly to expand the program of studies. For instance, under his direction, the *Diplom* degree program in actuarial science transitioned into the master’s program of the same name. ■

# Global challenges and the coronavirus crisis.

**Pascale Baeriswyl** studied law, history and French literature and linguistics at the University of Basel. She has previously worked as a researcher and served as an ordinary judge at the Basel Civil Court. In 2000, she joined the Swiss diplomatic service, holding various posts including at the embassy in Hanoi, the Swiss mission to the EU in Brussels and the UN in New York. In 2016, she was appointed Switzerland's first female state secretary and chief diplomat. She has been an ambassador to the UN in New York since June 2020.

**O**n 26 June 1945, the United Nations Charter was signed by 50 nations in San Francisco. It took two months of negotiations involving 850 delegates before the visionary document could be unanimously adopted. 75 years later to the day I was confirmed as Switzerland's Permanent Representative to the UN – in a virtual ceremony, as New York is currently in a state of emergency due to the coronavirus pandemic. Thousands of people have lost their lives here, while the economic and social consequences of the crisis are still impossible to gauge. The crisis mode that shapes our daily working life mirrors the global challenges we wrestle with every day in our debates.

How do I and my 40-strong team represent Switzerland on the bank of the East River in these peculiar times? Churchill once quipped that “the United Nations was set up not to get us to heaven, but only to save us from hell.” I might put it more prosaically: the UN, with its 193 member states, is the world's most universal organization. Its headquarters are a place where all state actors – and many others – have the opportunity to discuss crisis prevention, speak on behalf of people in need or develop global standards. However much the end of multilateralism is invoked or overstated, the fact remains that this is a place where countless people and topics converge. In times of polarization, compromise can be hard to come by. As a result of Switzerland's culture of dia-

logue, we are often called upon as bridge builders. It is also in our own interest to play this part; as a global export nation with a humanitarian tradition, we depend on carefully calibrated power dynamics.

How do we make a difference in concrete terms? With regard to development, as a contributor to the United Nations budget we play a part in shaping how the UN provides local assistance, for instance in the wake of the recent explosion in Beirut. In July, I was elected vice-president of the Economic and Social Council, which is working to mitigate the impacts of the Covid-19 pandemic. Its efforts are guided by the 2030 Agenda for Sustainable Development, which also provides a roadmap to tackle the climate crisis. When it comes to human rights, one of our key priorities is promoting women's rights. And for 2023/24, the Swiss Federal Council has applied for a place on the UN Security Council, invoking our tradition of peacebuilding. So far, our bid to join the council is uncontested. It means that we are further strengthening our efforts toward peace and security.

“The city that never sleeps” has been hit hard by the crisis. There is little sense of *gemütlichkeit* in the global village right now. Nevertheless, we are deeply moved by the resilience and solidarity on display. It is this *esprit* that we would like to take with us to the UN in order to face up to the challenges ahead of us shoulder to shoulder. ■



Switzerland's ambassador to the UN:  
Pascale Baeriswyl before a New York cityscape.





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Photo: Andreas Zimmermann

**Moisés Mayordomo**

## **Bolaño's *The Savage Detectives*: An unflinching, urgent narrative.**

**“We surrender ourselves to Bolaño’s world for the same reason we surrender to anesthesia at the hospital.”**

*The Savage Detectives* (2007, “Los detectives salvajes”, 1998) by Roberto Bolaño, who was born in Chile in 1953 and died in Barcelona in 2003, tells a story that is almost – or entirely – impossible to summarize. Still, I’ll give it a try: in 1970s Mexico, Arturo Belano and Ulises Lima run an avant-garde literary group called the “Visceral Realists”, invoking the missing poet Cesárea Tinajero. Their adventure-filled search for the poet lasts from 1976 to 1996, taking them to the Mexican desert and other settings around the world. Ultimately, they experience an anticlimactic showdown – if such a thing is actually possible.

The characters’ quest is recounted in the form of diary entries by a young “Visceral Realist” (parts I and III) and notes from conversations with the people involved (part II). This creates an ironic panopticon of the literary scene in the time after 1970. The “revolutionary modernity” project is on its knees; literary creators are sexually hyperactive, literarily inward-looking, poor out of principle, apathetic out of conviction. Ultimately, we do not know what Visceral Realism is. Instead, we are given fragments,

perspectives, judgements, satirical sideswipes and glorious episodes packed with tragic humor.

It’s a long time since I read a book that challenged me in this way. The infectious power of the language, the loss of a sense of time, the testing of hermeneutic patience, the joy of the bizarre, the sensual and the other – this book epitomizes all the wonderful experiences reading can provide. This joy is perhaps itself bizarre – the book could easily be labelled “postmodern meta-literature” – but such categorization can’t dampen the desire to read. I had the same feeling as when reading Kafka, Nabokov or Borges: being in a storytelling world that wasn’t cooked up in a literary studies laboratory, but instead follows an unflinching, urgent narrative. We surrender ourselves to Bolaño’s world for the same reason we surrender to anesthesia at the hospital: because the doctor knows what they’re doing better than anyone else. When we return to reality after more than 600 pages, our memory is filled with scenes and moods, scents and sounds, people and places – an experience that is equal parts sensual and intellectual. ■



They told you so

## The Covid-19 pandemic as a trial run for preppers

Text: Antonia von Schoening

**Preppers used to be dismissed as alarmists. Hardly anyone took their warnings seriously. It turns out they weren't so wrong after all. What preppers lack, however, is a plan for the post-catastrophe world.**

"Now is our time to shine." This was the jubilant reaction from preppers online when a state of emergency was declared due to Covid-19. These are days of triumph for them. Preppers are, after all, prepared for calamities of all kinds, be they earthquakes, terrorist attacks, economic collapse or epidemics. They have laid in supplies of food. They know how to filter water, start a fire and survive power outages. They have stockpiled protective clothing, medication, tools and weapons.

Preppers know people don't take them seriously. They see themselves portrayed in the media as paranoid freaks. But what we're going through now is what they've been predicting: disaster has struck. Suddenly, the skills of survivalists are in demand. The group running the website ThePrepared.com, which provides information, test reports and film reviews for "sane prepping," currently is overwhelmed by requests for help. "We are swamped," founder John Ramey wrote in an email describing a situation it seems they were not quite prepared for ...

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