Think.

An inquisitive magazine from Umeå University × No 1 2017

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THE ARCTIC

– THE CANARY OF THE WORLD

GROWING INTEREST IN ARCTIC RESEARCH

UMEÅ UNIVERSITY

Northern lights over Campus Umeå.
Photo: Mattias Pettersson

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Think is the Umeå University magazine focusing on research. This issue puts extra emphasis on the Arctic — a highly topical subject in which climate change is brought to attention.

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Production: OTW
Print: ÅTTA.45, Stockholm

UMEÅ UNIVERSITY

The Arctic as indicator of global well-being

Photo: Elin Berge

The Arctic is faced with great challenges when it comes to climate change, natural resources, issues regarding Indigenous peoples, health, culture and social life. Many countries are greatly affected by happenings in the Arctic, the melting glaciers and disappearing ice, which in effect has consequences on ocean currents, northern seas and in the long run – the possibilities of living on northern latitudes.

BUT THE ARCTIC is also the canary of the world. The region works just like the bird that mine workers used to carry with them underground to warn about dangerous gases: If the Arctic is suffocating – and the Arctic is – it's high time for people around the world to wake up and act.

AS A UNIVERSITY, we can use both research and education to show that the situation in the Arctic affects the rest of the globe, its weather, infrastructure, trade and industry and the diseases we are at risk of. However, we can also show what life in the North really involves – and what future humans can expect here. Together, we must contribute to increasing the understanding of our present situation and – in the long term – create a more sustainable behaviour.

At Umeå University, prominent Arctic research is conducted within all scientific fields. Sweden's only Arctic Research Centre – Arcum – can also be found here. Its multidisciplinary research constitutes a united force and mine of information to the entire world. Umeå University is also one of five Swedish universities collaborating with the Swedish Institute for the Marine Environment through Umeå Marine Sciences Centre (UMF). The Climate Impacts Research Centre (CIRC) in Abisko is another important centre here through which researchers have long studied and spread information on the effects of climate and environmental changes in Arctic and Alpine ecosystems. Recently, Umeå University also became a part of the Joint Arctic Agenda, a newly established collaboration to join university resources in Sweden, Norway and Finland regarding Arctic issues.

UMEÅ UNIVERSITY HOLDS a leading position in Arctic research, and in this issue of Think, you can read more about news on the Arctic. This issue also covers how the University offers education for people regardless of background and how it forms a good basis for new technological advances – in other words, several ways of reaching a more sustainable future.

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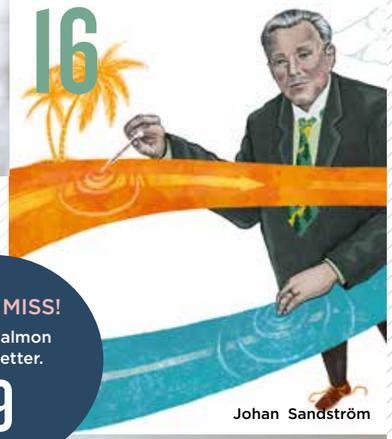
Umeå researcher Maja Sundqvist uses variations in altitude to explore how climate change can affect alpine and arctic ecosystems.



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Those who fail the proficiency test can undergo complementary training at Karolinska Institutet, the University of Gothenburg or Linköping University.

HASSAN PASSED THE TEST

31-year-old Hassan Baqer was one of the first doctors of medicine educated outside the EU and EEA to pass a new Swedish proficiency test for medical doctors.

He has now started his practical service at the Gullviksborg Health Care Centre in Malmö.

"When I'm done. I can apply for my medical licence."

By: **Daniel Harju, Markus Välimaa** Photo: **Kennet Ruona**

In 2016, the National Board of Health and Welfare selected Umeå University to design, account for and implement a national programme of proficiency tests for doctors of medicine with training outside of the EU and EEA. The objective of the tests is to, within a reasonable time, safely assess and license doctors with foreign degrees in order for more doctors of medicine to join the Swedish medical profession.

"When I passed the proficiency test, I was soon able to find a placement. I got lucky on the first interview, and will be working here for six months. Then I'll be able to apply for a medical licence through the National Board of Health and Welfare," says Hassan Baqer, who grew up in Sweden and hence has what he calls 'the advantage of speaking Swedish'.

Hassan Baqer took his medical degree in the US at Ross University in Florida. During his medical education, he undertook clinical training at hospitals in Florida, New York, Michigan and Illinois.

"When I was training at an emergency unit in Queens, New York, I realised that I wanted to specialise in emergency medicine. I enjoy the demands set on me as a doctor in that field – the quick decisions and swift assessments," he says, and is planning on specialising in emergency medicine, preferably at an emergency unit in his home town of Malmö.

IN 2016, when Hassan Baqer moved back to Sweden, he found out that Umeå University was going to offer proficiency tests that same year to replace TULE – a validation test that had previously been offered by Karolinska Institutet. Contrary to the TULE test, the new test validates knowledge in doctors of medicine who have already gone through a foundation programme. That means that the new test sets higher demands on qualifications, at the same time as it offers a faster route into work.

Hassan Baqer took his medical degree in the US, at Ross University in Florida.

ACCORDING TO Hassan Baqer, the proficiency test is well set out. Together with other people who have already completed or are planning on taking the test, he is now a part of a Facebook group in which doctors support each other in providing advice. In the group, he often emphasises how important it is for doctors of medicine with a foreign background to be proficient in Swedish when they take the tests.

"You don't need to be on a native level, but it's so important that I really recommend people to take a 3–4 month intensive course in Swedish first. I also often say that optimism and patience is important."

HASSAN BAQER can relate somewhat to the criticism some people have directed at the proficiency test, suggesting that the theoretical part was too hard. Since some people have long experience as specialists, it can be difficult to remember what they once learnt in the basic courses.

"It's really good that this fast track has been set up, and it's nice to see so many people moving forward. I'm pleased to hear when someone passes one of the sub tests, because I know myself how good it felt!" T

Two-part test

The proficiency test – given four times per year – is split into two parts to test theoretical and practical proficiency.

Those who pass both tests must then take a course on the Swedish constitution, show proof of approved Swedish proficiency, and undergo practical service before they can apply for a medical licence from the National Board of Health and Welfare.

Applicants have three attempts to pass the theoretical part and two for the practical part.

So far, 51 people have been approved on the theoretical test and 15 on the practical test.

Heister takes her seat

Chris Heister, county governor of Stockholm County, is the new chairperson of the Umeå University Board since 1 May.

Photo: Mikael Sjöberg

Sporting gold to Umeå

Iksu ladies floorball team took their fifth Swedish gold medal this year. The team has six Umeå students who are combining elite athletics with studies at various programmes. Umeå School of Sport Sciences at Umeå University is one of three national sports universities in Sweden. It enables elite athletes to adapt their studies to match with the requirements of their sport through an elite athlete agreement.

UBMEJEN UNIVERSITIÄHTA

Ume Sami logo an obvious choice

Umeå University lies in Sápmi, Sami land, and the location of Campus Umeå has strong ties to Sami culture. Only about a hundred years ago, the campus fields were used as winter reindeer grazing land for the Rans reindeer-herding community, which means that university students and staff are daily treading on traditional Sami land. That makes it natural to also offer the University logo in Ume Sami.

Asta gives name to an asteroid

Asta Pellinen-Wannberg at Umeå University gets the honour of naming a celestial body. Asteroid *11807 Wannberg* is 6 km in diameter and is moving near Mars.

Help climate research in Abisko

In 1917, Swedish botanist Thore C. E. Fries studied how the vegetation varies with season in the Abisko National Park in North Sweden. Now the study will be repeated to document how hundred years of climate change have affected plants. Using a mobile app, hikers will assist with the data collection. Researchers are hoping to open the research trail in mid-June 2017.

Environmental professorship

Greenland expert John Anderson holds a royal environmental professorship at Umeå University from 2017–18.

Prestigious scholarship to art student

Jonas Silfversten Bergman, student at the Umeå Academy of Fine Arts, receives the 2017 Fredrik Roos Scholarship for his skill in developing art based on industrial materials, colour and symbols.

40,000

people commute daily to Campus Umeå out of a population of 123,000.

The level of methylmercury in zooplankton can sevenfold in coastal regions in the Northern Hemisphere, for instance the Baltic Sea region. Photo: www.geomar.de

MERCURY IN PLANKTON CAN INCREASE IN THE NORTH

Methylmercury is an organometallic mercury compound and an extremely poisonous neurotoxin that can be accumulated in living organisms in the food chain.

New research is showing that the level of methylmercury in zooplankton can increase sevenfold in coastal regions in the Northern Hemisphere, for instance the Baltic Sea region.

This is due to the warming climate leading to increased runoff, and that humic substances in the aquatic system alter the structure of the aquatic food web. The poison is hence concentrated in several steps and reach higher levels in zooplankton.

The study is a collaboration between Umeå University and the Swedish University of Agricultural Sciences.

Reduced need for animal testing

Toxicological investigations have traditionally been performed on animals. The method is expensive, time-consuming and may cause animal suffering. New research at Umeå University is now showing that cultured neuronal cells from a mouse can be used to evaluate the neurotoxic effect of chemicals. The alternative toxicity risk assessment could reduce reliance on animal testing while also enabling quick large-scale toxicity evaluations.

Dina Popova

"Simple and robust cellular models are important because they allow us to screen a large number of chemical compounds including environmental pollutants, cosmetics, food preservatives and drugs," says Dina Popova, researcher at Umeå University.

Photo: Linda Gabrielsson

TECHNOLOGY WIDENS OUR SENSES

Improved safety aspects, and also enhanced experiences are at the focal point of Rouien Zarin's research. He designs prototypes for situations that require concentration and coordination, for instance when practising various forms of extreme sports.

By: **Gunilla Stendahl** Photo: **Johan Gunséus**

Pulsating mechanism

Rouien Zarin has developed an interface conveying route information to mountain bike cyclists without them having to take their eyes off the road.

The handlebars are equipped with a pulsating mechanism, and a gps system connected to the mechanism provides information on upcoming changes in terrain or course.

Rouien Zarin studies sports in relation to technology, and is developing construction solutions to enhance the experience of training. He has studied various materials, sensors and reconnection mechanisms to find the most appropriate way to make users aware of information during sporting events such as cycling or skiing.

Rouien Zarin came to Umeå to take his Master's at Umeå Institute of Design.

New gadgets pop up all the time, so what makes your research stand out?

"There's an array of connected, portable devices on the market, but there's still a need for in-depth focus on creating a more meaningful experience. When we use computers in and around our bodies, they become more intimate. This puts great demand on technology to not make us lose focus, but rather offer support. To build a good relation to technology, we must pay better attention to the situations where these interactions can occur. At best, a gadget can kill the aesthetic experience of physical exercise. At worst, it can increase risks of dangerous situations."

What importance can your research have?

"My research shows that the placement of technology can contribute to widening our human senses in a safe way and simultaneously increase awareness of the world around us. Maybe we should stop thinking about mobile technology as devices, and instead see them as portable ecosystems. With that, I mean a constellation of devices that can be linked to other devices or services. These could be interesting on their own, but most importantly provide an even better result when combined." T

Nowadays, the Swedish Arctic covers Norrbotten County, Västerbotten County and the mountainous region.

WIDENING THE IMAGE OF THE ARCTIC

By: **Jonas Lidström** Photo: **Malin Grönborg och Mattias Pettersson**

In Sweden, we have had a tendency to purposely increase distance from the Arctic. region, but things are changing.

Nowadays, both the Norrbotten and Västerbotten counties count as the Swedish Arctic.

This also helps Umeå University assert its status as the Arctic University in Sweden.

What is the Arctic? The question is trickier than it seems, as the answer becomes more political than scientific. This according to Dieter Müller, professor in human geography and Deputy Vice-Chancellor of Umeå University.

"The academic community can have ideas on how to define the Arctic, but so can a lot of people. And they are likely to use their own ideas irrespective of what we say."

TO SEVERAL of the northern countries around the world, the Arctic border question is associated with a geopolitical fight over natural resources, transport routes and climate. The two superpowers in all of this are Russia and Canada.

"Canada has a strong impulse to uphold that it is an Arctic nation," says Dieter Müller.

OUR NEIGHBOURING country in the East is a geographically closer example. Finland regards the whole nation as a part of the Arctic. Whereas Sweden has not recognised the Arctic in the same way, suggests Dieter Müller:

"Here, there has been a rather large disinterest to get involved in Arctic collaborations. One reason might be a legacy of an old social initiative aimed at making Sweden and Swedes equal, regardless of geographical position. That didn't leave room for an Arctic perspective."

THE SWEDISH population has long regarded the Arctic Circle as the Arctic border. But according to Peter Sköld, professor in history and director of the Arctic Research Centre at Umeå University (Arcum), Sweden has also started accepting a wider boundary.

Dieter Müller

"At present, the Swedish Ministry of Foreign Affairs is working on a definition of the Swedish Arctic including Norrbotten County, Västerbotten County and the mountainous region," says Peter Sköld.

"Widening the image of the Arctic is an issue that has long been at the top of the agenda for Arcum. It will help reinforce the Arctic identity in Sweden."

THE POLICY change means that Umeå University nowadays with ease can assert its status as the Arctic University in Sweden. Even if it, like Dieter Müller suggests, has long been obvious from an international perspective:

"Umeå University is a very important Arctic university in the way that we are recognised as a significant centre for research in this area. Hence, in one way we don't need to energetically set up a profile as an Arctic university at all – because we're already an important part of this field thanks to all the great research conducted here," says Dieter Müller. **T**

POPULATION STUDIES IN THE HINTERLAND

The traditional idea of rural Sweden must be challenged, according to researcher duo Dean and Doris Carson, who are both affiliated with the Arctic Research Centre at Umeå University. They are also one example of the migration and development often forgotten about in present-day analyses.

By: **Camilla Andersson** Photo: **Johan Gunséus**

“The negative image of the hinterland risks becoming a self-fulfilling prophecy. Reality is somewhere in between,” says Dean Carson.

Inland Västerbotten in May 2017. Some last patches of snow remain, together with a few reindeer wandering about. Timber trucks race through small villages that seem further and further apart. According to established views, this is a destitute region with a stagnant development due to mass outmigration – a view that is overly negative according to researchers Dean and Doris Carson, demographer and human geographer respectively:

“Individual villages can, for example, have an increasing influx of international migrants instead,” says Doris Carson.

“However, since the demographic development of smaller villages is not looked at in detail, many people are still unaware of it. Politicians take for granted that people move to the chief municipal towns, and hence plan for it,” says Dean Carson.

THE COUPLE studies population mobility and the demographic future for villages in northern peripheries in Sweden, Australia, Canada and Alaska. Dean Carson focuses on general migration and on the recruitment of educated labour to the sparsely populated hinterland. Doris Carson’s focus lies on tourism and lifestyle related mobilities in rural areas.

In 2014, they came to the Västerbotten inland from Burra, a small community in South Australia. They rent a house in the small, picturesque forest village Pausele, about 180 km from Umeå and 50 km from Lycksele town. In winter, they can put their cross-country skis on on their doorstep and take off into the forest. In summer, they canoe and fish – mostly for perch and pike – in the nearby waters.

“We’re studying the development of sparsely populated areas, and also want to live in the areas we’re studying,” says Doris Carson, who commutes to Umeå University a couple of days per week.

DEAN CARSON has an office at the Sweden Centre for Rural Medicine in Storuman – a growing international research hub that opened in 2013. He also keeps in touch with Charles Darwin University in Australia over Skype and email. Together with research colleagues in a number of countries, he works on the international project *Recruit & Retain*, where they study how to attract and keep medical doctors, nurses and other qualified staff in the sparsely populated hinterland.

Doris and Dean Carson are two of the project leaders for the projects *Cities of the North* and *Modelling demographic change in small villages.*

DORIS CARSON has interviewed international lifestyle migrants who have moved to villages in inland Västerbotten. The village Åskilje, neighbour with Pausele, is an evident example. In recent years, the village has had a striking international influx. 15 of 101 inhabitants are lifestyle migrants, mainly from Great Britain. In the Lapp cot-looking reception building at Åskilje Camping, we meet Suzi and Rhyl Jones who come prepared with ‘fika’. They have run the camping for seven years, and come from England and Wales.

Dean Carson

Age: 47 years.
Background: Grew up in Australia.
Does: Professor at Charles Darwin University, Australia. Presently based at the Sweden Centre for Rural Medicine in Storuman and visiting professor at the Arctic Research Centre at Umeå University.
Research: Has studied demographic factors and population mobilities in northern peripheries for two decades.
Interests: Fishing, canoeing, hiking, golf, basketball, darts, Australian rules football, and playing the guitar.
Reads: Detective novels

“We have never looked back with regret. Just look at the view,” says Rhyl Jones, pointing at the water outside the window.

“This is not a business to make money. It’s a lifestyle,” emphasises Suzi Jones.

WITH US at the table is Neil Parker, a former construction worker from England, who moved here with his family.

“We mainly moved for our kids. Here, they can run around freely, whereas in England you need to keep a constant eye on them,” he says.

DORIS CARSON has heard many similar stories in her interviews with other migrants:

“When people choose to move here, it often happens really quickly. They move to where empty houses are for sale, and that causes a chain reaction among migrants.

And the smaller villages are more attractive, not communities like Storuman with 2,200 inhabitants.

“They may as well stay where they are, otherwise.”

ACCORDING TO previous theories, the development in larger cities such as Umeå will influence smaller towns and villages in the region. But according to Dean Carson, that is only applicable to areas closer to the city. Places like Storuman have actually never benefited from bigger cities, instead they have had to look out for themselves. Being small-scale improves flexibility and dynamic change.

“These places are like islands, and it can be an advantage when in present-day you can look for expertise and excellence all over the world and you can focus on attracting those who want to spend their time in this type of region,” says Dean Carson.

“But in order to uphold continuity, a strong base is needed in the local community that can handle and embrace such a change.” **T**

Doris Carson

Age: 33 years.
Background: Comes from Fürstenfeld in southeast Austria. Took her doctoral degree at James Cook University, Australia.
Does: Researcher and lecturer at the Department of Geography and Economic History and the Arctic Research Centre at Umeå University. Affiliated researcher at Charles Darwin University, Australia.
Research: Studies population mobility and socio-economic development in small communities in sparsely populated, northern areas.
Interests: Fishing, canoeing, hiking, golf, tennis, cross-country skiing, mushroom picking and playing the piano.
Reads: Books on history

“We hope that our research will make people aware of what happens in our villages. You can pick out the goodies and develop upon them, and start considering how to attract new villagers,” says Doris Carson.

STRONG ARCTIC RESEARCH ON SWEDISH SOIL

CURIOUS?
Find out more about the Arctic on arcum.umu.se

Nearly five years ago, Sweden established its first Arctic Research Centre – Arcum.

Ever since, the centre at Umeå University has brought together 270 affiliated researchers from wide-ranging fields. This summer, Arcum is organising a large international conference on the future of the Arctic.

By: **Camilla Bergvall**
Foto: **Elin Berge och Lars Öberg**

Umeå is the centre of Swedish Arctic Research.

The first Swedish Arctic Research Centre was established in 2012 – and its positioning at Umeå University was the natural choice. Besides being located in the North, Umeå University conducts Arctic research in all scientific fields, for instance on climate and the environment, Indigenous peoples, tourism, migration, health and the spread of diseases.

"Our strength is to coordinate a critical mass of researchers from various fields to collaborate and inspire each other. We're also actively working to introduce new disciplines and attract young researchers," says Peter Sköld, director of Arcum.

SINCE THE Arcum grand opening, Sweden – and Umeå University – has made a huge leap within international Arctic research. Peter Sköld also acts as President of the International Arctic Social Science Association (IASSA) and is hence one of the organisers of the grand international conference ICASS IX, which is being held in Umeå 8–12 June 2017.

"We won't be focusing on climate data, but on the consequences to the population and the region. Our ambition is for the conference to result in tangible suggestions on how to prepare and adapt our Arctic communities on what the future has to bring."

Peter Sköld

A DEBATABLE issue is how the Arctic – with its countries, Indigenous peoples and nationalities – should be governed and coordinated, and what rules and regulations should apply. Another financial and political hot potato is how the once so inaccessible natural resources – such as minerals, natural gases, oil and fish – should now be extracted and used in a sustainable way, and who should own the rights to them.

"Territorial claims when it comes to rights to sea beds are naturally intricate, but the Arctic is a highly strategic area also in other ways. Researchers can present scientific facts and theoretical know-how, but our politicians make the decisions in the end," says Peter Sköld. **T**

In Norway, a Sami on average has a 1.6 year shorter life expectancy than a non-Sami person.

WITH SAMI HEALTH IN MIND

Indigenous people's health is generally worse than the average population – with life expectancy variations of 15 years. But in order to explain the Swedish health situation, an important piece of the puzzle is missing.

"There's no statistics that enables an understanding of Sami health," says Umeå researcher Per Axelsson, who is now planning a public health study – on Sami terms.

By: **Jonas Ericson** Photo: **Elin Berge, Tero Laakso and Malin Grönborg**

Swedish constitutional law prohibits the collection of data on ethnicity making it impossible to compare the health of Indigenous and non-Indigenous peoples. In a majority of the countries in the world it is legal and the differences become more evident.

"Those born into an Indigenous family can unfortunately expect poorer health and a shorter life," says Per Axelsson at Vaartoe, the Centre for Sami Research. But great differences between countries also exist. In Norway, a Sami on average has a 1.6 year shorter life expectancy than a non-Sami person, whereas the difference in Canada between an Inuit and a non-Inuit is up to 15 years.

Per Axelsson

THE REASONS are tied to how Indigenous peoples have been colonized and the speed of how the colonization has taken place. The colonization of Sápmi took place over a long period and the advantages of the welfare society such as vaccinations and pension systems included everyone in the country.

Per Axelsson

Associate professor in history at Umeå University and Wallenberg Academy Fellow
Works at: Vaartoe, the Centre for Sami Research and the Department of Historical, Philosophical and Religious Studies
Age: 44 years
Family: Wife and two children
Lives: Stöcksjö outside of Umeå
Current: Is planning a public health survey in Swedish Sápmi

Norwegian Angelica has been an important source of vitamins for the Sami and mountain settlers.

"Taking Australia for example, colonizers relocated Aboriginal peoples to reserves, and they were not allowed to qualify as Australian citizens until 1967.

HOWEVER, SWEDEN also has a dark history of racial biology and forced relocations.

"This is why it's incredibly important for the planned public health survey to be conducted in collaboration with the Sami society. The Sami must themselves be allowed to decide what information is gathered and how it's used.

The survey will be carried out in collaboration with Senter for samisk helseforskning in Norway, which has conducted two similar surveys in the past.

"We wanted to do what the Sami-Norwegian study has done and ask participants to join a health survey where it's up to them to state if they're Sami or not," says Per Axelsson.

IN LATER years, alarming reports on discrimination and suicide among the Sami have emerged.

"But not until we have completed the survey will we be able to make statements about Sami health in Sweden, and what health promoting activities may be necessary." **T**

NEW CONTAMINANTS EMERGE DUE TO GLOBAL WARMING

As the permafrost thaws, frozen anthrax bacterium is brought back to life while malaria-carrying mosquitoes and ticks bearing encephalitis infect new victims. In the footsteps of climate change, both known and unknown infectious diseases lie in wait, and communities must be prepared.

By: **Camilla Bergvall**
Photo: **Mattias Pettersson och Elin Berge**

Ticks collected in the Umeå region are analysed for borrelia and other tick-borne diseases.

A warming climate makes cold-loving animals and plants move higher up the mountains, deeper into the waters or aim for colder polar regions. This also means that insects, bugs and mammals sensitive to the cold can survive and be competitive in new habitats. And with those animals as hosts, it also leads to an increased risk of further spreading various infectious diseases.

BIRGITTA EVENGÅRD, researcher at Umeå University, is one of 40 experts who in an article in *Science* warns that communities and economies – from the tropics to the poles – are already affected as species are changing their areas of distribution as a response to climate change.

Birgitta Evengård

"The ecosystem changes we now see affect the very core of humanity – medically, socially and economically. However, studying species movement is a complex business that requires good collaboration with various areas of expertise. Simultaneously, new research findings must also rapidly reach decision-makers and citizens. Through this study, we show that species movement is a parameter that ought to be integrated in the UN sustainability goals," she says.

VARIOUS TYPES of mosquitoes and ticks are spreading rapidly. On average, land animals move at a speed of nearly twenty kilometres per decade. Parasite passengers – that is the unicellular malaria parasites and viruses causing tick-borne encephalitis (TBE) – are hence given the chance to conquer new latitudes. Even infectious agents that have long been hidden in the permafrost can be released as contaminated and buried carcasses thawing out of the ground due to the warming climate.

"This threat needs to be taken most seriously. One anthrax outbreak has already occurred in Siberia in summer 2016. It killed thousands of reindeer, and also parts of the population fell ill. Hence, it's now high time to realise that entire communities can face risks. We need to increase preparedness for known and unknown threats of infectious diseases."

CLIMATE CHANGE does not only affect increased temperatures, but also other weather occurrences can become more important.

"An extreme amount of rain polluted the drinking water in Östersund with a parasite. The sewage treatment plants were quite frankly not built to handle these large amounts of water. The infrastructure must hence also keep up with research," says Birgitta Evengård. **T**

Species movements affect people in numerous ways

- Natural resources and primary produce such as fish, forests and crops may change.
- Industries such as tourism and recreational fishing are jeopardised.
- Conflicts can emerge as species move between economic zones.
- Health can worsen in regions previously spared from certain diseases.
- Indigenous cultures can be affected.

ALPINE ECOSYSTEMS UNDER THE MICROSCOPE

Studying nature in a slow-changing climate is time-consuming. But Maja Sundqvist speeds things up by using natural variations in altitude in different mountain regions to explore how a warmer climate will affect both alpine and arctic ecosystems.

By: **Camilla Bergvall** Photo: **Tyler Logan and Mattias Pettersson**

MORE
On umu.se/en/arctic, you can read longer versions of some of the Arctic content found here in Think.

Ecosystems on high mountains and in cold areas are sensitive to a warming climate. But vegetation and land conditions change slowly when temperatures are increasing, and it takes time to follow the progress in these often inaccessible areas. To speed up the process, Maja Sundqvist and her research colleagues use natural elevational gradients in mountain regions as 'climate laboratories'. The lowest temperatures are measured at the top of the mountain, and with declining elevation it gets gradually warmer – almost like sneaking a peak into the future.

"Mountain ecosystems are hot spots for biodiversity – they contain many unique species that are highly sensitive to climate change. Signs of a warming climate can already be seen. Some plants are more common in tundra areas – deciduous shrubs, for instance – and in some areas certain species are now found at higher elevations than previously observed," says Maja Sundqvist.

Maja Sundqvist

MAJA SUNDQVIST is studying the interplay between how plants and soils change along these natural gradients, and in experiments with varying average temperatures, grazing pressure, elevation and type of vegetation. In one study, she and her research colleagues measured diversity, nutrient dynamics and productivity on elevation gradients in seven various temperate zones around the world: Central Europe, Hokkaido in Japan, Eastern Australia, New Zealand, Colorado in the US, British Columbia in Canada and Patagonia in South America.

"Remarkably, some effects of changes in temperature with elevation in these widely spread mountain regions were relatively similar. With ongoing climate change, we can expect ecosystem changes in mountain regions, partly associated with a shifting balance between nitrogen and phosphorus." **T**

Vegetation and ground conditions change slowly with rising temperatures. Photo from Abisko in Northern Lapland.

THE BRAINS BEHIND THE GULF STREAM

FROM VINDELN VILLAGE TO THE ROYAL SWEDISH ACADEMY OF SCIENCES

Young Johan Sandström gazes out through the cottage window. The snow is blazing and is piling up against the façade of the boat house in a swirl. The snow is formed differently on the leeward and windward sides, and he starts to draw sketches of his observations – the wind currents and snow formations.

By: **Erik Törnlund** Illustration: **Felicia Fortes**

When his father dies in 1889, he convinces his mother to leave the farm in the Västerbotten hinterland. He has only turned fourteen. It takes two weeks by kick-sled to Sundsvall. The job at the sawmill only becomes a necessary hold-up.

The main aim is higher education, something more than the three years in compulsory education he so far had completed. Some decades later he is elected into the Royal Swedish Academy of Sciences and becomes a member of the Nobel Committee.

Still without academic qualifications.

IN 2014, Erik Lövgren, an exchange student from Umeå University, studies in French Grenoble. In a lecture, his teacher is explaining the Gulf Stream and Sandström's theorem.

Indeed, it sounded like a Swedish name, which made Erik Lövgren curious enough to hit Google. As it turns out, this Sandström, christened Johan Wilhelm, was born in 1874 in Degerfors in Västerbotten County.

Degerfors was the old name of Vindeln, Erik Lövgren's own neighbourhood, that is.

He sends his dad, Lars Lövgren, a message, who is an inorganic chemistry lecturer at Umeå University: 'What do you know about Johan Wilhelm Sandström?'. The answer is short: 'Nothing'.

Curiosity again make them look more closely into this J W Sandström, or 'the Gulf Stream Sandström', which some call him.

"What's particular about Sandström is his class journey from very sparse circumstances. It took a lot of ambition, contacts and stamina to prove himself," says Lars Lövgren.

"And he had the gift – *gåvon*," continues Lars Lövgren using a local northern Swedish dialectal expression.

The explanation of the Gulf Stream phenomenon is J W Sandström's masterpiece, and what makes him world-famous in meteorology and oceanography in the early 20th century – and still today.

Johan Wilhelm Sandström

Johan Wilhelm Sandström was born on 6 June 1874 in Degerfors, Västerbotten county, and died in 1947.

He was a Swedish oceanographer, physicist and meteorologist.

Elected into the Royal Swedish Academy of Sciences in 1925.

The theory had been introduced before, but J W Sandström brings evidence to the case. The Gulf Stream originates from warm air and water mass on southern latitudes being drawn to the cooler northern hemisphere and the Arctic Ocean. The current also attracts warmer winds over the Scandinavian Peninsula with large effects on our current climate.

And the effects are indisputable: "Without the Gulf Stream, Sweden would be an uninhabitable island of ice, like Greenland, or a forestless tundra like Siberia," says J W Sandström.

J W SANDSTRÖM starts his physics and mathematics studies at the then Stockholm University College. He has several famous teachers such as the chemist Svante Arrhenius, Nobel laureate in 1903, and mathematician Gösta Mittag-Leffler.

In 1898, he is employed as an assistant at the forerunner to the Swedish Meteorological and Hydrological Institute and five years later, he becomes chief hydrographer at the Bornö research station. In 1906, J W Sandström is recruited by Professor Vilhelm Bjerknes, one of the most prominent meteorologists of the time, to Kristiania University College in Oslo.

It is here that J W Sandström develops the explanations to the cause and effect of the Gulf Stream, and his scientific production reaches an all-time high.

But in 1925, when he gets elected into the Royal Swedish Academy of Sciences, it is not without a hitch. After all, he has neither grades nor a degree. At the end of the day, however, it is his scientific experience that provides him with a seat.

IN 1919, J W Sandström becomes director of the Swedish Meteorological and Hydrological Institute, which in turn became the SMHI, and holds his position until his retirement in 1939.

Though he is no office character. In order to understand the impacts on mountain climates and snow conditions, he spends winters in the Swedish mountains. He also travels to the Arctic Ocean where measurements of winds, currents, salt levels and other factors are conducted. He also constructs a rather peculiar craft for polar expeditions with which he travels with his wife and a mechanic on the Bothnian Bay ice for a few weeks.

So what can we learn from J W Sandström's legacy?

"The importance of empirical material to confirm a theory, to measure and verify, as well as taking initiatives to spur other researchers on. And you need to be persistent," says Erik Lövgren. **T**

Solar powered charging stations on campus will become available for electric bikes.

EN ROUTE TO A SUSTAINABLE UNIVERSITY TOWN

A time-saving cycle superhighway, chargeable cargo bikes and an out of the ordinary bus stop hub. In the next few years, a great deal of climate smart actions will take place on the Umeå University main campus.

By: **Camilla Bergvall** Photo: **Ulrika Bergfors**

About 40,000 people commute daily to Campus Umeå out of a 123,000 population. Only 3,000 stay overnight. Sometimes the area can therefore feel somewhat desolate. However, since 2013 great plans are developing to make the area more attractive. Many stakeholders invest over a billion SEK per year into buildings, accommodation, infrastructure and sustainable energy consumption. Umeå has also been granted EU funding for *Ruggedised* – a Smart City project focusing on the University District.

"Within 10–15 years, Campus Umeå will become a place bustling with life around the clock," says Carina Aschan, project manager and strategic developer at Umeå municipality.

"Many of those who strive for a sustainable life will be attracted by new kinds of accommodation that render cars unnecessary. Rent could include space in a stairwell fridge to which food can be delivered by the supermarket."

Ruggedised
means 'robust', and is also an acronym for **R**otterdam, **U**meå, **G**lasgow **G**enerating **E**xemplar **D**istricts **I**n **S**ustainable **E**nergy **D**eployment.

Carina Aschan

WHAT WILL be more noticeable are the new transport routes on and through campus. On a regular working day in 2019, you can shorten your commute by minutes thanks to a new, wide cycle superhighway through campus. If you wish, you can also borrow an electric cargo bike to do your weekly shopping. The bikes – charged by solar cells and special batteries – will first of all be available at three stations.

"But the idea is for the cargo biking network to expand in time," says Carina Aschan.

SOME IMPORTANT keystones in the climate venture will be practically invisible, such as a geothermal storage for heating and cooling, and a sensor system registering how people move to optimally distribute energy between buildings. A new web platform for open data will also be set up to collect data on energy consumption, travel data, and crime and accident reports across Umeå.

FOR ELECTRIC cars, there will be two large clusters of charging stations. If you instead choose to travel by bus, you will have a remarkable experience at the Universum bus stop. When the electric bus halts, the transit hub attaches to the bus like a jetway to an airplane. This reduces heat loss, and the bus can run longer on one charge.

"The idea is also to increase the status of travelling by bus and to give passengers an experience while waiting. Although, the challenge of designing a bus stop that feels both safe and attractive remains. Having a good dialogue with members of staff and students is therefore important," Carina Aschan points out. **T**

Ana Mendieta, Sweating Blood (cropped still photo from film), 1973 © The Estate of Ana Mendieta Collection, LLC. Courtesy Galerie Lelong, New York.

Ana Mendieta at Bildmuseet

Blood, fire, earth, water and her own body; artist Ana Mendietas striking works from the 1970s and 1980s are a delicate balancing act between vulnerability and strength. Gender, identity and the body were recurring themes, such as also metaphors for life and death, trauma and exile. The contemporary art museum Bildmuseet's exhibition is shown from 18 June until 22 October focusing on Ana Mendieta's films and is the largest presentation of Mendieta's artistic practice shown in Sweden.

Lake water volume smaller than expected

The lakes on Earth are more shallow than previously estimated. This in turn means that the supply of fresh water is also relatively scarce.

Umeå researcher David Seekell, together with American collaborators, has estimated the total volume of lake water in the world. The results show that there is only about 190,000 km^3 of lake water on the planet. In comparison, the oceans contain 1.3 billion km^3 of water.

Lake water is a scarce natural resource, and the quantity and quality can rapidly change due to human activities. Roughly 80 per cent of the lake water on Earth can be found in the 20 largest lakes alone, for instance the Caspian Sea, Lake Superior and Lake Baikal.

David Seekell

Foto: Marcus Marcetic, KAW/KVA.

High-tech restaurant opens for research

The most advanced research restaurant kitchen in Sweden is now found in Umeå – on campus, of course. It belongs to the School of Restaurant and Culinary Arts and opened in February.

"Gastronomy encourages growth and Sweden has the world's best basis for food production," said gastronomy expert Carl Jan Granquist at the grand opening.

Besides the high-tech kitchen, the restaurant section also has an audio-visual system that enables the studying of roles in the kitchen and dining room for educational and research purposes.

The research restaurant is a milestone in the school's journey towards an operation with increased academic features. Through certain periods, the research restaurant also serves lunch and dinner to the public.

Umeå University's new research restaurant. Foto: Ulrika Bergfors

Happy salmon swim better

The fear of the unknown can to some extent influence when young salmon start their migration downstream towards the sea. As it turns out, salmon treated with anxiety medication travel both further and faster than untreated fish. This according to research at Umeå University.

New research vessel has docked

A newly renovated and fully-equipped research vessel will be travelling its first nautical miles for marine sciences this summer. The vessel will work all over the Bothnian Bay, but will be stationed at Norrbyn and Umeå Marine Sciences Centre at Umeå University.

5,000
cyclists bike through and on Campus Umeå every day.

Reindeer help mitigate global warming

A study led by researchers from Umeå University suggests that reindeer play a part in slowing down climate change. Grazing reduces height and abundance of shrubs with the result that solar energy reflects back into space with cooling effects on the climate.

BECOMES COMIC STRIP PRO ON FASCISM

Comic strips are easy on the eye, and to many a starting point into the excitement of literature. In 2017, historian and researcher on fascism Lena Berggren, is having many people's dream come true – she is becoming a comic strip character.

By: **Camilla Bergvall** Illustration: **Kalle Johansson** Photo: **Elin Berge**

"To begin with, it felt odd, and it was tempting to also ask for super powers and maybe a cool outfit," says Lena Berggren.

It is the cartoonist and graphical designer Kalle Johansson who in his new book *What is Fascism?* has included Lena Berggren as a guide and expert in a complex subject:

"I'm hoping the cartoon will appeal to the wider general public, both adults and young adults. It would be incredible if it could be used for educational purposes," he says.

Kalle Johansson believes cartoons can have a great educational potential, particularly for people less used to reading other literature.

"A great advantage is that every box, page and spread differs from the other, which hopefully triggers curiosity."

Lena Berggren sees many advantages:

"In a comic strip, you can handle several layers and dimensions simultaneously, and help clarify processes. In that way, a comic strip becomes much more easily accessible."

Lena Berggren

Lena Berggren, associate professor in history at Umeå University, studies fascism and other forms of extreme nationalism. Her dissertation dealt with Swedish antisemitism in the interwar period. Currently, she is working on an overview analysing ideologies of Swedish Fascism from 1920–1950, which will be published in 2018.

UMEÅ UNIVERSITY