Islam has never been a problem for me as a scientist. However, what is a big problem is industrially-oriented thinking; the subordination of science to money, which in detail regulates what we should do research on.
A long, band-like plant that can grow up to one metre tall grows under the surface of the Baltic Sea. Common eelgrass (Zostera marina) is a seed plant of marine origin. Eelgrass grows in extensive meadows on the sea bottom, at a depth of one to eight metres, along the coast of the Baltic. In Finland eelgrass often grows together with other seed plants of sweet water origin. This is something unique to the Northern Hemisphere, whereas eelgrass meadows usually consist of eelgrass only. Fields with several species are normally found only in the tropics.

In his research, Docent Christoffer Boström, lecturer in marine biology at Åbo Akademi University, studies the function of coastal ecosystems, specifically the flora and fauna of eelgrass beds.

“...a considerable proportion of all eelgrass meadows in the Northern Hemisphere are found in Scandinavia. Recent estimates show that there are over 2,100 km² of eelgrass in the Nordic region and the Baltic Sea. Probably there is much more. Eelgrass grows on open sand bottoms and sways slowly with the movements of the water. It is a very beautiful and peaceful environment to dive in,” says Boström.

“The eelgrass meadows are called the ‘coral reefs’ of the Baltic Sea, and they are both important and beautiful. The many roles of eelgrass in the marine ecosystem make the green meadows very fascinating. At first sight the meadows might seam uninteresting, but on looking closer, you will see that they swarm with life. Eelgrass is a so-called key species that gives shelter and nutrition to many organisms and provides humans with a number of ecosystem services, such as coastal area stabilisation, oxygen production and carbon and nutrition sinks. The ecosystems in the Baltic might not be as colourful as the coral reefs, but they are all the more interesting when you learn what to look for,” says Boström.

Eelgrass is a very important plant in the ecosystem in the Baltic Sea, but it is threatened by human activities. For example, nutrients that cause eutrophication, and dredging and anchoring at unsuitable places cause eelgrass to disappear. Globally, seagrass beds disappear at a rate of 110 km² per year, which is even faster than the pace at which coral reefs and rainforests are disappearing.

The largest losses of seagrass have been noted in Denmark, Germany and on the Swedish west coast. There are no long-term studies in Finland, but it is obvious that eutrophication, muddy waters, overfishing and drifting algal mats constitute the main threats to the meadows in the Archipelago Sea and the Åland Islands. In addition, the Finnish eelgrass beds are usually a hundred- to a thousand-year-old giant clones, which makes them particularly vulnerable. If one clone disappears in an oil catastrophe, it will never return.

Boström carries out his research using the Korpoström Archipelago Centre in Finland as his base. He has supervised several doctoral students working on seagrass themes, and he acts as an expert within a campaign of the World Wildlife Fund (WWF) which aims at making the distribution and biology of seagrass meadows better known.

Text: Mia Henriksson
Photo: Teemu Koppa / Lehtikuva
Universities carry a considerable responsibility in the form of providing education, the development of new experts and the creation of new knowledge. As societies have been built and developed, a central position has been— and still is— given to the establishment of strong university environments which contribute to continued development. In the Nordic region higher education has so far been free and the universities have to a large extent been funded by state resources. THIS IS, however, no longer a given. Term fees have been introduced for students from countries outside of the EUEFTA; the number of universities has decreased and there is increasing competition for funding. These changes are caused by diminishing state finances and government cutback programmes, as well as political trends.

LOOKING AT this development from the perspective of university history, we can see that over the years universities have undergone many reforms and have been influenced by various passing social trends. This goes to underline the role of universities as key actors in society. The centennial history of Åbo Akademi University will be published in time for the university’s 100-year anniversary in 2018. It will contain interesting reading and analyses of how a university is created and how it develops. More on the history can be read in this issue of the News Bulletin.

A UNIVERSITY lives and survives thanks to students who thirst for knowledge, teachers who are enthusiastic and researchers who are innovative. The central values that inform the activities of Åbo Akademi University are diversity, openness, courage, participation and sustainability. In this issue you can also read about Parvez Alam, one of our international researchers, who truly stands for diversity and courage as a researcher and as an individual.

WISHING everybody an interesting read!

Thurid Eriksson
Head of Communications
Editor-in-Chief

ISSN 1796-7147
Published by Åbo Akademi University communications

26 Why is ice slippery?
It is only recently that physicists have been able to provide a satisfying answer to this fairly easy question.

24 Åbo Akademi University 100 years
A history in three parts of the 100 years of Åbo Akademi University will be published by its centennial year, 2018.

21 Nobody is born a Jihadist
It is difficult to identify any clear and simple profile for those who tend to be recruited to IS. At the same time, West has rationalised the significance of religion and ideology in terrorist acts.

20 New threats challenge slow state bureaucracy
How quickly do authorities respond and make new concrete decisions based on various reports and other signals from their intelligence and security services?

10 Biopunk
We travel to Cape Town with bioscientist Parvez Alam, a researcher that brings to mind the historical and romantic descriptions of expeditions into the unknown.

07 Small pharmaceuticals, great effects
As technology has developed and improved, researchers are now starting to realise the potential of nanomedicine.

22 What damage is caused by long-term use of antidepressants?
Depression places an increasingly heavy burden on society, although we have an effective medicine for it. The reason might be that long-term use may cause unwanted side effects.

CONTENT

07 Small pharmaceuticals, great effects
10 Biopunk
20 New threats challenge slow state bureaucracy
21 Nobody is born a Jihadist
22 What damage is caused by long-term use of antidepressants?
24 Åbo Akademi University 100 years
26 Why is ice slippery?
GRIEF KILLS: ANNIVERSARY EFFECTS ARE STRONG AMONG MOTHERS

RESEARCH AT Åbo Akademi University shows that the death of a child increases the risk of death of the mother. A study carried out by Jan Sarella, professor of demographic epidemiology, demonstrates that the risk of death among mothers who have lost a young child is particularly high around the anniversary of the child’s death. Such anniversary effects, or a concentration of ill health around certain dates, have been frequently debated and analysed in international literature for many decades, but have now for the first time been quantified by rigorous analyses of a large population. The study shows that the risk of death among mothers who have lost a child is increased by almost 50 per cent during the anniversary week. In cases where the child died after infancy the effect is even larger.

The results indicate that grief might have a causal effect on people’s ill health, and thus that previously observed connections between the poor health of children and parents do not necessarily only depend on environmental or genetic similarities between parents and their children.

The study was published in the European Journal of Epidemiology and it is the result of continuous cooperation with researchers at the Centre for Health Equity Studies, the Harvard School of Public Health, the Karolinska Institute and Stockholm University.

TEXTBOOKS ALSO GIVE VISIBILITY

DMITRY MURZIN, professor of industrial chemistry at Åbo Akademi University, published his second textbook on chemical engineering in late 2015. He had been contacted by a large German textbook publishing house as his first textbook on catalysis, published in 2013, had received a positive response all over Europe. “We don’t have a common educational system in Europe, but what we do have are many different countries and a common labour market. This means that although we as teachers mainly train our students for the Finnish market, we also have to make sure that the qualifications our students receive qualify them for international posts. And therefore we must be aware of what is taught at other universities,” Murzin explains.

Chemical engineering is a specialised science which is often focused on products – on what processes are needed in order to make a certain product – while the subject of chemistry is a fundamental science. Murzin, therefore, wanted to write a book that would overlap both these areas of chemistry.

The books are richly illustrated. “We also took care to include my own experiences, from both industrial and academic environments, in short insights which took the form of interludes within the actual text. This has proved to be a very popular feature.”

Another example of a textbook written at Åbo Akademi and intended for an international audience is Chemical Reaction Engineering and Reactor Technology, written by Tapio Salmi, J.P. Mikkola and Johan Warnå. It was published in the USA in 2011 and was very well received. “Textbooks give us visibility and showcase our expertise. We shouldn’t be shy to admit it. In my teaching the work we provide here is of a world-class quality. But it’s quite difficult for people, particularly from abroad, to find their way here if they aren’t familiar with the quality of the teaching and research that we carry out.”

BETTER TREATMENT OF ALLERGIES

ALLERGIES ARE one of a number of new and widespread diseases in the Western world. Close to 20 per cent of the population are estimated to suffer from allergic colds, asthma and other conditions related to hypersensitivity.

“The results indicate that grief might have a causal effect on people’s ill health, and thus that previously observed connections between the poor health of children and parents do not necessarily only depend on environmental or genetic similarities between parents and their children.”

The study was published in the European Journal of Epidemiology and it is the result of continuous cooperation with researchers at the Centre for Health Equity Studies, the Harvard School of Public Health, the Karolinska Institute and Stockholm University.

WHAT IS NANOmedicine?

Nanomedicine can potentially result in more effective drugs with fewer side effects. But the road to that end is lined with challenges.

“I also took care to include my own experiences, from both industrial and academic environments, in short insights which took the form of interludes within the actual text. This has proved to be a very popular feature.”

Another example of a textbook written at Åbo Akademi and intended for an international audience is Chemical Reaction Engineering and Reactor Technology, written by Tapio Salmi, J.P. Mikkola and Johan Warnå. It was published in the USA in 2011 and was very well received. “Textbooks give us visibility and showcase our expertise. We shouldn’t be shy to admit it. In my teaching the work we provide here is of a world-class quality. But it’s quite difficult for people, particularly from abroad, to find their way here if they aren’t familiar with the quality of the teaching and research that we carry out.”

“What is Nanochemistry?”

Not a utopian dream

Nanoparticles are smaller than can be discerned with the naked eye, but they are counted as material. Roughly speaking this means that they are considerably smaller than single molecules – or amalgamations of molecules, which in turn, to put it simply, are formed of bonds between atoms of various chemical elements.

While the particles are larger than both molecules and atoms, they are so small that they are not influenced by gravity to any significant degree. And compared to body cells, the nanoparticles are tiny. One reason as to why its chemical characteristics change when a particle is very small is the relatively large proportion of the atoms that are situated on the surface of the particle instead of being bound to each other inside. With many atoms on the surface, a particle is very reactive (to such an extent that it might even cause so-called nanotoxicity, i.e. health risks). In very small particles most atoms can, in fact, be situated on its surface.

“We are interested in nanoparticles because they are approximately as small as the body’s own biomolecules. This means that they can circulate around the body. The body might not recognise nanoparticles as foreign material, as they are small enough and can be designed in such a way that the immune system doesn’t recognise them,” says Rosenholm.

“Nanoparticles can be accumulated in tissue and absorbed by cells. That is why we’re interested in using them as drug carriers. We can fill them with pharmaceuticals – for example cytostatics that are aimed only at the tumour and not at healthy cells, as this leads to side effects. If we’re able to send the drug exclusively to the cancer cell, then only is affected by the cytostatic.”
"The pharmaceuticals already on the market, that is, the first generation of nanodrugs, are not entirely selective. They do transport more effectively around the body than if the medical substance was given on its own without the liposome as a carrier system, but they could be more selective and more effective, and include more functions, for example abilites such as actively seeking their target, visualising and circumventing drug resistance."

**Carrier systems**

The possibility of targeting the delivery of traditional drugs in the body is limited. After a pharmaceutical substance is dissolved into the body from, for example, a pill, its subsequent fate is dependent on the chemical and physical characteristics of the drug molecule. The possibilities of prior manipulation of the drug molecule in order to direct it towards the destination where it is intended to have an impact are small, since every operation changes the molecule and thus also its medical effect.

Nanopharmaceuticals provide an opportunity to direct the movements and absorption of the drug in the body. There are, nevertheless, several difficulties involved in doing this. First of all, the immune system must be "cheated" into not recognising the drug-carrying particle as something foreign to the body, but rather allowing it to circulate for long enough to find its way to the place where it is intended to have an impact. Secondly, the drug molecule must be efficiently accumulated and released in the appropriate place in the body. And finally, the destination of the pharmaceutical molecule is often a protein in the cell, and therefore the aim is that the cell shall absorb the drug, which is to find its correct place in the cell.

In order for this to succeed a so-called ‘carrier system’ is created, consisting of particles with the appropriate chemical and physical characteristics for all three aspects to function. These particles are then loaded with the molecules of the pharmaceutical substance – there might be room for millions of them in one nanoparticle.

Chemical design provides many opportunities for giving the carrier particle the desired characteristics.

"We try to make the carrier system behave in the way we want it to. After that we can basically load the particle with any drug molecule without affecting the carrier system. The system takes the drug molecule to its set destination and releases it there," says Rosenholm.

"The exact way of doing this is a question of nanoparticle design, which is what we focus on in our daily work at the lab. It involves playing with chemistry," Rosenholm explains.

One way of creating the particles is to start concretely with a large block of the material, which is ground into small particles, but Rosenholm’s research group starts from the opposite direction, building their particles molecule by molecule. The carrier systems they create usually consist of porous ceramic silicon dioxide particles.

"We begin with solutions that we mix together. The components included in the solution are molecular and separate from each other, but when they are mixed, they start to accumulate and react with each other, becoming linked to larger and larger elements, particles. By playing with temperature, solvents and pH values we can see to it that they don’t grow too large," says Rosenholm.

"Our silicon dioxide particles are porous. When the particles are completed, we put the drug substance into the pores. We prepare a solution of the drug, add the particles and let the two merge overnight. It’s crucial that the surface chemistry of the particle pore walls is such that it attracts the drug substance. By using a ‘poor’ solvent the drug molecules will rather be absorbed by the particles than stay in the solvent. Then we can remove the particles from the solution using a centrifuge, vacuum dry them and – voilà! – we have a completed nanopharmaceutical."
IS and al-Qaeda

New security threats challenge slow state bureaucracy

Attacks on nightclubs, sports arenas, parks and streets, in editorial offices, youth camps, refugee housing, the metro and on board aeroplanes. Are the decision-makers able to keep up with these threat scenarios?

TEXT & PHOTO: ARI NÝKVIST

The threat from various extreme movements, paramilitary forces and pure terrorist organisations, which so far might have seemed rather diffuse to us in Finland, is coming closer to home. Can the Finnish decision-makers keep up with the rapid changes and new threat scenarios that challenge the security of civil society?

Unfortunately, they cannot.

This is the answer given by Doctor Lars Nicander who is the Director of the Centre for Asymmetric Threat Studies (CATS) at the Swedish Defence University in Stockholm. He received his doctorate in political science in late 2015 at Åbo Akademi University in Vaasa, Finland, with his thesis New Threats – Old Routines. Bureaucratic adaptability in the security policy environment.

CATS focuses on studying asymmetric threats in the age of information. The centre’s main areas consist of terrorism studies, intelligence studies and information operations such as cyber security, cyber defence and information operations.

For his thesis at Åbo Akademi University, Nicander particularly explored the fundamental question of how quickly authorities, for example government offices, respond and make new concrete decisions based on news reports and other signals from their intelligence and security services.

“The cold war up to the 1990s created a very stable world. There was no need for fast responses, but there was the time for slow and bureaucratic decision-making on investing in, for example, new weapon systems such as aircraft, tanks or warships. But in the 1990s it was soon realised that the new and increasing use of various IT systems made the new information society entirely vulnerable and easy to influence, beyond and despite all existing military security measures. We acquired what is called a ‘critical infrastructure’,” Nicander explains.

New social values to protect

The new and often unpredictable security threats spread their tenta- cles further and also into civil society. There were suddenly a large number of new values in society to be protected against an increasing interest among various groups, movements and organisations in manipulating, threatening and attacking these values. At the same time several countries, such as Sweden, had to a large degree adjusted to a new form of state government, which is usually called ‘New Public Management’ where just-in-time delivery and narrow security margins were the norm.

“And in the 2000s, after 9/11 in 2001, direct threats and attacks from various terrorist groups increased in number. We haven’t seen such extensive, competent attempts from such terrorists to also attack the USA or European countries through cyber space. They probably do not so far have the resources or the know-how that such attacks require,” Nicander says.

There are not many pre-existing theories, or much empirical material on the issues explored in Lars Nicander’s doctoral thesis, which include how closed monopolies in the state apparatus, such as intelligence services and various independent authorities, collaborate in order to respond to new threats.

On the other hand, there have been rapid changes in the way in which, among other organisations, the Islamic state, IS, acts and operates. Only recently it was commonly believed that IS would not follow al-Qaeda’s example and attack civil targets outside of its own area and region. According to Nicander, the only solution for countering this new threat is better and more adjustable intelligence services with sufficient powers.

“In this respect, the former NSA employee Edward Snowden has contributed to creating a situation where many intelligence services are more or less blind, at least for the time being. But on the other hand, many countries also have themselves to blame. As all questions and problems pertaining to security and external threats to the security of the citizens, for example in Sweden and Finland, have been treated in a tightly closed system without qualified and competent, independ- ent second-opinion functions, there is a lack of what in Britain, for example, are called ‘critical friends’. Therefore the readiness to change and the will to cooperate are weak and in that case relatively self-suffi- cient authorities become stronger, as is the case in Sweden.”

New secure but open think tanks are needed

A far too strict secrecy thus leads to a kind of incrementalism: autho- rities continually add new talents to the battle against, for instance, terrorism, but at the same time nobody is prepared to reduce or even adjust the existing talents and tools. This results in there being even less money than before left for concrete and rapid measures.

“There is no coordination of resources that could be used much more efficiently than presently in order to respond to, among other things, the new security threats,” says Nicander.

His suggestion for increasing pluralism and adaptability in security policies is therefore to facilitate the creation of more so-called inde- pendent think tanks in the form of ‘universities without teaching’. These think tanks could be partly modelled on the international Chul- ham House, but in these new bodies security classified persons from various open positions and spheres of interest in society could evalu- ate and analyse the security situation and recommend new govern- ment measures.

“This is perhaps challenge and present a competitive edge to the old and somewhat self-concerned knowledge monopoly in this area. As it is, there are simply too many muddled bottlenecks which obstruct the process.”

Such bottlenecks can be cleared by increasing government offices’ willingness to quickly adopt reports from intelligence services and other signals of new security threats. And to more swiftly include counter measures in budget negotiations and then implement these in a competent manner.

Naturally, Nicander respects the slow but democratic decision- making process where the rule of law is the guiding principle, but he would like there to be a governmental unit that in a professional way could provide comprehensive risk evaluations and focus on long- term planning of defence measures and general security. These are missing today.

“Above all, our government offices need better procurement skills. They must know how to steer and focus the executive social activities in order to create incentives to overcome the inability to change which is innate to bureaucracy.”

There is no coordination of resources that could be used much more efficiently than presently in order to respond to, among other things, the new security threats.

Nobly is born a Jihadist

“Introducing new strict laws against increasing terrorism is not enough. Deeper and more extensive preventive work, including numerous local measures in countries such as Sweden and Finland is more important than ever in this situation,” says Doctor Magnus Ranstorp, one of Europe’s leading experts on terrorism and mili- tant Islamic groups such as al-Qaeda, Hamas and Hezbollah. He is Research Director at the Department of Security, Strategy and Leadership at the Swedish Defence University, Head of Terrorism Studies at the university’s Centre for Asymmetric Threat Studies.

According to Ranstorp, we in the West have relativised the sig- nificance of religion and ideology in the increasing occurrence of terrorist acts.

“In our secularised and individualised countries we find it diffi- cult to understand that the rest of the world is much more collecti- vised and religious than we are. In Sweden our politicians have fa-iled to admit this, and have therefore also to a large degree failed in the Swedish integration policy.”

Totally stopping the flow of asylum seekers to Sweden and Fin- land because a small number of jihadists might enter among them, is, according to Ranstorp, not a good solution. Instead, it should be possible to identify these people more easily and mo- re quickly than before, by better cooperation between the autho- rities in the EU concerning, for example, passport information and other ID biometrics.

And all refugees and new asylum seekers cannot be lumped to- gether. There are sectarian tensions also between various refugee groups, different Islamic denominations and groupings, the attitude of Christian refugees to Islam and vice versa.

“This is a veritable mosaic of totally different individuals with opposing dynamics between the groups they are part of. And it is a fact that some extreme groups seem to be increasingly inclined to violence. But the colours and patterns in the kaleidoscope are con- stantly changing. The prime colours can be made up of socio psy- chological factors, such as country of origin, adventure-seeking, religious and ideological pondering and various family ties, but al- so of purely social and political factors.”

“Nobody is born an extremist. Together we can counteract vio- lent extremism through preventive work aimed at strengthening individuals and society. We have not yet seen any larger scale, well- planned attempts at systematically smuggling in Sunni Salafist fighters in Sweden. But when the passports of such fighters are confiscated in countries such as Belgium and France, they instead try to enter Europe on falsified Syrian passports.”

It is difficult to identify any clear and simple profile for those who tend to be recruited to IS. The engine of radicalisation has ma- ny cylinders and they may consist of strong group dynamics, a few good friends, a person’s own family and, increasingly today, of soci- al media, where various spikes and trends are present.

More preventive measures at the local level with various knowl- edge centres and citizens’ forums, counselling and support for traumatised persons and their families, and a more effective fol- low-up of correctional treatments are needed as a complement to stricter legislation and longer punishments.

“I am deeply concerned because of the increasingly marginali- sed position that immigrants and refugees are forced to live in Sweden. The infrastructure in immigrant-dense areas contributes to the growth of social gaps and so society will not be able to endure the severe social pressures which will consequently emerge.”

Lars Nicander, Magnus Ranstorp and defense chairperson Steve Lindberg.
Parvez Alam is a docent in natural materials at Åbo Akademi University. He plays a central role in fifteen different advanced bioinspired projects. He is a biohacker. He is married and the father of two children. He is the founder of the world’s largest charity organisation within combat sports. He is an ex-professional skateboarder. He is an ex-punk rocker. He is a practising Muslim. He recently turned forty.

TEXT & PHOTO: MARCUS PREST
Alam and his colleague, Professor Anusuya Chinsamy-Turan, are talking about the giraffe cranium. Parvez cannot take the cranium with him back home to Turku, Finland, since it is, first of all, too unwieldy to transport, and secondly, it would take too long to acquire all of the permissions needed. Although it’s a matter of skeleton parts and not living material, the bureaucracy required to move a cranium from one continent to another is massive. What Alam can, however, use, is data from a scan of the giraffe cranium.

“What kind of scan, a CT scan?” Chinsamy-Turan asks.

“Yes, CT is good. I can go down to 10 microns with my own gear,” Alam answers.

“Is that meaningful? Shouldn’t you try and keep it on a scale where you can see the larger patterns?”

“When I go down low enough, I can see various layers and whether the layers have different structures”

“But you must at least stay on a scale where you can see how the tissues interact.”

The hypothesis about giraffes (which is relevant for dinosaur researcher Chinsamy-Turan’s work) is that long-necked dinosaurs and giraffes have directly related fight tactics which in turn relate to sexual selection. And that the aggressive behaviour displayed in the fight between two male giraffes could correspond to the way in which male dinosaurs fight each other. For Alam, the interesting features are the construction of the cranium and the composition of the skeleton – that is, the structure of the bone. The bone of the giraffe’s cranium does not consist of solid material, but instead it looks rather like fused sugar.

“Look at these channels that go through the skull; these have not been studied before”

Alam shows me a part of the cranium.

“And check this out: the same zipper-like binding between different skeletal parts as those that I showed you on the piece of whale cranium I have in Turku.”

From a material technological perspective it is interesting that the giraffe skull is light, while it also seems to exhibit great durability; male giraffes have directly related fight tactics which in turn relate to sexual selection. And that the aggressive behaviour displayed in the fight between two male giraffes could correspond to the way in which male dinosaurs fight each other. For Alam, the interesting features are the construction of the cranium and the composition of the skeleton – that is, the structure of the bone. The bone of the giraffe’s cranium does not consist of solid material, but instead it looks rather like fused sugar.

“Look at these channels that go through the skull; these have not been studied before”

Alam shows me a part of the cranium.

“And check this out: the same zipper-like binding between different skeletal parts as those that I showed you on the piece of whale cranium I have in Turku.”

From a material technological perspective it is interesting that the giraffe skull is light, while it also seems to exhibit great durability; male giraffes have directly related fight tactics which in turn relate to sexual selection. And that the aggressive behaviour displayed in the fight between two male giraffes could correspond to the way in which male dinosaurs fight each other. For Alam, the interesting features are the construction of the cranium and the composition of the skeleton – that is, the structure of the bone. The bone of the giraffe’s cranium does not consist of solid material, but instead it looks rather like fused sugar.

“Look at these channels that go through the skull; these have not been studied before”

Alam shows me a part of the cranium.

“And check this out: the same zipper-like binding between different skeletal parts as those that I showed you on the piece of whale cranium I have in Turku.”

From a material technological perspective it is interesting that the giraffe skull is light, while it also seems to exhibit great durability; male giraffes have directly related fight tactics which in turn relate to sexual selection. And that the aggressive behaviour displayed in the fight between two male giraffes could correspond to the way in which male dinosaurs fight each other. For Alam, the interesting features are the construction of the cranium and the composition of the skeleton – that is, the structure of the bone. The bone of the giraffe’s cranium does not consist of solid material, but instead it looks rather like fused sugar.

“Look at these channels that go through the skull; these have not been studied before”

Alam shows me a part of the cranium.

“And check this out: the same zipper-like binding between different skeletal parts as those that I showed you on the piece of whale cranium I have in Turku.”

From a material technological perspective it is interesting that the giraffe skull is light, while it also seems to exhibit great durability; male giraffes have directly related fight tactics which in turn relate to sexual selection. And that the aggressive behaviour displayed in the fight between two male giraffes could correspond to the way in which male dinosaurs fight each other. For Alam, the interesting features are the construction of the cranium and the composition of the skeleton – that is, the structure of the bone. The bone of the giraffe’s cranium does not consist of solid material, but instead it looks rather like fused sugar.

“Look at these channels that go through the skull; these have not been studied before”

Alam shows me a part of the cranium.

“And check this out: the same zipper-like binding between different skeletal parts as those that I showed you on the piece of whale cranium I have in Turku.”

From a material technological perspective it is interesting that the giraffe skull is light, while it also seems to exhibit great durability; male giraffes have directly related fight tactics which in turn relate to sexual selection. And that the aggressive behaviour displayed in the fight between two male giraffes could correspond to the way in which male dinosaurs fight each other. For Alam, the interesting features are the construction of the cranium and the composition of the skeleton – that is, the structure of the bone. The bone of the giraffe’s cranium does not consist of solid material, but instead it looks rather like fused sugar.

“Look at these channels that go through the skull; these have not been studied before”

Alam shows me a part of the cranium.

“And check this out: the same zipper-like binding between different skeletal parts as those that I showed you on the piece of whale cranium I have in Turku.”

From a material technological perspective it is interesting that the giraffe skull is light, while it also seems to exhibit great durability; male giraffes have directly related fight tactics which in turn relate to sexual selection. And that the aggressive behaviour displayed in the fight between two male giraffes could correspond to the way in which male dinosaurs fight each other. For Alam, the interesting features are the construction of the cranium and the composition of the skeleton – that is, the structure of the bone. The bone of the giraffe’s cranium does not consist of solid material, but instead it looks rather like fused sugar.

“Look at these channels that go through the skull; these have not been studied before”

Alam shows me a part of the cranium.

“And check this out: the same zipper-like binding between different skeletal parts as those that I showed you on the piece of whale cranium I have in Turku.”

From a material technological perspective it is interesting that the giraffe skull is light, while it also seems to exhibit great durability; male giraffes have directly related fight tactics which in turn relate to sexual selection. And that the aggressive behaviour displayed in the fight between two male giraffes could correspond to the way in which male dinosaurs fight each other. For Alam, the interesting features are the construction of the cranium and the composition of the skeleton – that is, the structure of the bone. The bone of the giraffe’s cranium does not consist of solid material, but instead it looks rather like fused sugar.
come into contact with two gentlemen who are involved in the gangs in the area. I have never come across competition in Northampton: as the participants were doing their trial runs on the ramp, one misunderstood the left and his board in the way of Parvez who at that moment was in the air above the ramp. Parvez crashed into the board, bending cracked his neck, prolapsing two cervical discs and exploding one. He was paralysed from the neck down. The surgeons who operated on him happe- ted my thesis to the surgeon who had led my operation team. I travel- ed to the hospital and gave him the thesis personally. We had a good long conversation."

Somewhere the three basic characteristics achieved by growing natural glass in doing this. The basic problem with other methods for transferring grains is that glass melts at 1,500 degrees Celsius. The organism do its job. Nobody else on the planet has so far succeeded in doing this. The participants in the concept’s fundamental sense: they do not require any energy or chemicals. What Parvez has explored is the production of natural glass for making a model of the crystallisation and a model of how a composite structure forms. The basic premise is breaking against the cliffs in foamy waves. Parvez immediately connected the sea. Out on the point we see penguins gathered on the beach. This is one of the really impressive shield against its surroundings. Sponges are similar to corals, but the spicules provide the organism with a structural stability and the ability to fasten onto stones. The spicules provide the organism with a structural stability and the ability to fasten onto other stones. The process is experimental at that point and involved taking material from his hip bone and connecting it with its vertebral by operating through a cut in his thumb. After living for two weeks in hospital he could not take it any more. Rising from his bed, he walked out of the ward and into the city without letting the staff know. He didn’t know how to take the support collar. Skateboarding was his only plan before the accident, after the acci- dent he continued skateboarding but also took up studying again. He was admitted to a college where he read biosciences – and received the highest grades in all the exams. Due to very weighty family reasons he missed his last examination and was expelled before graduating. He changed to another college and entered onto a course in building and materials technology. His old college phoned up when they realised that they had expelled one of their top students. They wanted to offer him the opportunity to return. Parvez told them to go to hell. He comple- ted his studies and started working. "While finishing my doctoral thesis I suddenly realised how lucky I had been in having that team of surgeons operate on me. Otherwise I would be paralysed now. And I also realised how badly I’d behaved by walking out without thanking those who had saved me. I dedica- te my thesis to the surgeon who had led my operation team. I travel- ed to the hospital and gave him the thesis personally. We had a good long conversation."
Parvez Alam’s research is bioinspired – meaning that he looks in the natural world for the structures and characteristics of materials. Marine organisms seem to be the dominant source of inspiration.

Coral and sponge mimetics for advanced composites

ENVIRONMENTALLY friendly materials are currently an object of great interest within green industrial engineering, but the development of environmentally-friendly green materials has not yet managed to achieve products that would either improve on or be comparable to the performance of synthetic materials. Corals and sponges form hard, rigid and strong skeletons that support and protect the soft organism within it. By imitating corals and sponges Alam thinks it is possible to attain the standards of synthetic materials, and sometimes even exceed them. Alam regards coral and sponge mimetics as a realistic means of developing genuinely green materials.

Bioinspired biomaterials for healing wounds and growing skeleton parts

A NUMBER of biological materials have a basic biocompatibility with the human body, which means that they can be bio-activated, that is, made reactive to the cells in the new environment into which the material is introduced. Many of the materials are also developed for integration with cells and are therefore compatible at the cellular level. Some are also able to eliminate harmful strains of bacteria and can improve blood coagulation and cell production. Many of the biological materials also have mechanical characteristics that are compatible with human tissue and human bone. The research group that Alam is cooperating with studies the characteristics of materials. Marine organisms seem to be the dominant source of inspiration.

The third article that Alam’s group published on cobwebs was submitted directly after a research group in Panama had published an article in Nature Scientific Reports which demonstrated that cobwebs actually move towards insects flying in, and take hold of them. The group showed that an electric charge in the insect’s body triggers the web, which is pulled towards the insect when it is close enough.

"We weren’t even aware that these people in Panama existed or that they worked on something similar. Our study differs from theirs in that our work shows how this functions at the molecular level. The molecules in the web organise themselves so that the cobweb stiffens and becomes immensely strong because of the electric charge carried by the approaching insect. This is why the web is not damaged when the insect hits it. When looking at a cobweb in slow motion it looks like a living organism."

Parvez’s group carried out its study using Molecular Dynamic Simulations (MDS), which is based on the principles for how the atoms in individual molecules behave when exposed to various types of influence, primarily electrostatic forces.

The simulation showed that when the cobweb molecules are exposed to an electric charge, they stretch themselves out because of the electric chain reaction.

"Our hypothesis concerning the durability of cobwebs pertains to this stretching effect. We checked out beta sheets, that is, organised secondary structure that cause crystals to form in biopolymers. We checked the polyalanine segments that form the beta sheets. We checked the hydrogen connections which are electrostatic secondary forces – in cobwebs large numbers of these emerge."

There are seven different types of cobweb. The flagelliform type is a gluey web which forms the radial web. It has a high yield stress and is very glutinous. Parvez’s group identified the amino-acids that render this web type gluey and, based on that data, they constructed a biological adhesive for wound healing by introducing the material with bacteriological nanocrystals.

"By controlling the amino-acids we can adjust the characteristics of the composite adhesive."

In cooperation with a colleague at the University of Jyväskylä Parvez is working on a project which aims at connecting two different types of cobweb in order to combine the stiffness characteristics with the adhesive qualities – this would be a material that does not exist in nature. This kind of bioinspiration is called synthetic biology. Here, too, the purpose would be to construct improved biomaterial for the healing of wounds.

Currently Parvez himself is trying to understand the SCD elements in cobwebs. SCD stands for semi-crystalline domain. Since the 1970s five scientific studies have been published, all of which are based on the hypothesis that the SCDs are crucial for the durability of cobwebs.

"The various kinds of cobwebs are classified into three different durability types hard, soft and medium-hard."

"As far as I know nobody has ever seriously studied how these SCDs are formed in cobwebs. I have a few hypotheses that I’m exploring. The first one is that SCD is formed in the connection between the crystals. The crystals influence the amorphous materials so that they turn into crystals and vice versa."

"My second theory is that if the crystals sheath over each other, SCD is formed."

"This is the third phase of a cobweb that gives it its huge capacity to absorb energy."

WHEN PARVEZ ALAM travels, he always takes with him his powerful individual work tools – his laptop, and when going to third world countries he also brings along another laptop so that students can use both his computers.

"What they don’t have a lot of in the third world is good computers."
According to him travelling to different places in the world, and above all outside of the Western world, gives perspectives that are necessary for a scientist. In other cultures our encounters different ways of thinking, and very different conditions for both everyday life and research. Different points of departure create alternative approaches to problems.

“I believe that one way of opening your eyes in your job as a scientist is to travel, to not just stay in Finland and attend a conference every now and then. I believe you develop your creativity by working in different cultures.”

“It’s not about any spiritual journey, although it might include that, and for me it has included that aspect, too. It’s about there being such an enormous amount of uncommitted and unused talent waiting to be discovered. What I meant when I said that you encounter different ways of thinking, is that scientists in the third world are often very free in their thinking and not committed to certain structures in the way we are. Of course, they have all kinds of problems, both in their organisations and in the lack of material and equipment, but they often have an open curiosity, thanks to which they might find very interesting and unexpected solutions within basic research, in discovering new ways of thinking, is that scientists in the third world are often very free in their thinking and not committed to certain structures in the way we are. "

There are a number of prejudices and perceptions concerning what religiosity must entail. Such as, for instance, that you cannot believe in evolution if you’re religious or Muslim. Evolution is an area where everybody thinks they’re experts. And there is a fundamental view of the role of evolution in the history of science. When people have read something by Charles Darwin they think they’ve reached point zero. They know nothing of what was going on much earlier. As if people hadn’t been able to think and make observations before that. And nobody seems to know philosophers such as Ibn Khaldun (1332 – 1406) who described human development phase by phase and hypothesised that humans originated from apes, or Al Jahiz (776 – 868) who actually sketched natural selection in a way similar to Darwin’s theory a thousand years before Darwin.”

“But speaking at a more general level, the lack of a philosophical background among natural scientists results in there being many researchers who are simply not able to think outside of the box, since they aren’t aware that they are in that box. To put it another way, they haven’t realised that their thinking, within science, is culturally limited. They still live in and to their social circles. They are unable to see that there are questions and methods that they can’t even consider, since the framework for their thinking is too narrowly defined and, furthermore, they haven’t noticed that there is a framework in the first place.”

Has your Muslim faith ever created an obstacle for you as a scientist?

“Islam has never been a problem for me as a scientist. However, what is a big problem is industrially-oriented thinking; the subordination of science to money, which in detail regulates what we should do.”

We finish off the day by going into the countryside outside of Cape Town, to see if we can find any venomous spiders. On the slopes scarred by forest fires Parvez pokes cobwebs and turns over decayed tree trunks. He finds no spiders. Nor any snakes. But he does find the skeleton of a wildcat. The skeleton fascinates him; he thinks we have been extremely lucky in finding it. He takes the cranium home with him.

Research on diatoms

Transport agents for pharmaceuticals: Concepts that Alam’s silica group has discovered in diatoms have given us new ways of deliver- ing pharmaceuticals. One of the advantages that have been disco- vered is the energetic stability of pharmaceuticals that are surround- ed by a matrix rather than immersed in a transport substance, and the objective of Alam’s group is to create a degradable skeleton which forms a capsule around the pharmaceutical substance. Skeletons that occur in nature are optimally adjusted to the molecules or cells that they surround. Alam’s group is trying to emulate that same process.

Biotecnology: Biotecnological solutions for developing glass surfaces around natural fibres and other materials. The biotechno- logy researchers whom Alam collaborates with are exploring and trying to biomimic the chemical and physical structures of the crab species Nais and turbinoids in order to find suitable fibre treatments that would enable diatoms to fasten onto the material. Alam’s group is developing specialised catalysts in order to improve the way silicon algae arrange themselves on fibre surfaces. The aim is to develop high-performance natural fibre composites.

Building engineering inspired by the mechanism in dragonfly wings

Alam’s group has studied the morphology and mechanics of the structures of several different types of dragonflies from various parts of the world (including Finland – where native dragonflies have unique development characteristics). Based on their insights into the function of the joints attaching a dragonfly’s wings to its body, Alam’s group has designed models for durable joining me- chanisms to be used in the building of earthquake-safe houses.

Amphibious fish (mudskippers) – biomechanics and robotics

Mudskippers are strange fish that can climb trees and have even been spotted sitting on tree branches. They are capable of brea- thing above water, creating a water bubble for oxygen diffusion and transporting the contents through their gills. Alam’s mudskip- per group has studied the fish’s movement patterns, slime secre- tion, clinging capacity, morphology and biomechanics in order to design a robot able to mimic the characteristics of the fish. The first two steps of characterisation have been done – what remains for the group is to understand the musculature and its lines of move- ment before they can start constructing robot functions.

A selection of researchers involved in Parvez Alam’s projects

Adelkoe Amoda
Focuses on implants based on diatoms.

Siti Fauziyah
Works on architecture based on the dragonfly wing-body mechanism.

Alex Morin
Studies how the Bombyx mori larva gummys their cocoons.

Erly Sintaya
Explores the biomechanics of cobwebs and the mod- delling of cobweb poly- mers, anti-HIV, octopus ink, bioscaffolds (fast grown corals), pistol shrimps.

Research on diatoms

Transport agents for pharmaceuticals: Concepts that Alam’s silica group has discovered in diatoms have given us new ways of deliver- ing pharmaceuticals. One of the advantages that have been disco- vered is the energetic stability of pharmaceuticals that are surround- ed by a matrix rather than immersed in a transport substance, and the objective of Alam’s group is to create a degradable skeleton which forms a capsule around the pharmaceutical substance. Skeletons that occur in nature are optimally adjusted to the molecules or cells that they surround. Alam’s group is trying to emulate that same process.

Biotecnology: Biotecnological solutions for developing glass surfaces around natural fibres and other materials. The biotechno- logy researchers whom Alam collaborates with are exploring and trying to biomimic the chemical and physical structures of the crab species Nais and turbinoids in order to find suitable fibre treatments that would enable diatoms to fasten onto the material. Alam’s group is developing specialised catalysts in order to improve the way silicon algae arrange themselves on fibre surfaces. The aim is to develop high-performance natural fibre composites.

Building engineering inspired by the mechanism in dragonfly wings

Alam’s group has studied the morphology and mechanics of the structures of several different types of dragonflies from various parts of the world (including Finland – where native dragonflies have unique development characteristics). Based on their insights into the function of the joints attaching a dragonfly’s wings to its body, Alam’s group has designed models for durable joining me- chanisms to be used in the building of earthquake-safe houses.

Amphibious fish (mudskippers) – biomechanics and robotics

Mudskippers are strange fish that can climb trees and have even been spotted sitting on tree branches. They are capable of brea- thing above water, creating a water bubble for oxygen diffusion and transporting the contents through their gills. Alam’s mudskip- per group has studied the fish’s movement patterns, slime secre- tion, clinging capacity, morphology and biomechanics in order to design a robot able to mimic the characteristics of the fish. The first two steps of characterisation have been done – what remains for the group is to understand the musculature and its lines of move- ment before they can start constructing robot functions.

A selection of researchers involved in Parvez Alam’s projects

Adelkoe Amoda
Focuses on implants based on diatoms.

Siti Fauziyah
Works on architecture based on the dragonfly wing-body mechanism.

Alex Morin
Studies how the Bombyx mori larva gummys their cocoons.

Erly Sintaya
Explores the biomechanics of cobwebs and the mod- delling of cobweb poly- mers, anti-HIV, octopus ink, bioscaffolds (fast grown corals), pistol shrimps.

Immanuel Sanka
Research work includ- es dial chitosan fibres, gene technolo- gy based on diatoms, bridge construction based on diatoms, replication of diatom surface. EPS analy- sis and biomodel- ling, and the pistol shrimp project, ana- lytical and experimental ink. Biohacker.
What damage is caused by long-term use of antidepressants?

Depression places an increasingly heavy burden on society, although we have an effective medicine for it. The reason might be that long-term use gives unwanted side effects.

TEXT & PHOTO NICKLAS HÄGEN

Anti-depressants experienced a boom at the end of the last century with the development of selective serotonin re-uptake inhibitors, or SSRIs. After a few decades during which frequent prescriptions have been routinely dispensed to individual patients, there are many who have begun to question the long-term use of these antidepressants.

The reason for this is a paradoxical result emerging from statistics from Western countries. There is a drug that is effective, it helps and cures people suffering from depression. But despite this the costs of incapacity and disability benefits keep increasing.

“Of course, working life has become more demanding and it’s difficult to assess the impact of that aspect. But in general the burden of a disease should diminish and not increase when an effective remedy has been adjusted. Drugs are used in cases of acute crisis, and if the treatment has been effective, it is continued. Many drugs are prescribed for a longer period have a weaker working memory, the question of whether a weaker working memory capacity has its root in the depression as such and to what extent this is caused by the illness,” says Mira Karrasch, head of research in psychology at Åbo Akademi University.

The current care guideline in Finland is that treatment with SSRIs should continue for several months, sometimes even years. It is estimated that close to 450,000 Finns took antidepressants in 2012. Of these over 100,000 had taken these medicines continuously for several years.

“Why is that? It is known that working memory and the executive functions in general are reduced when a person suffers from depression. The question is to what extent this is caused by the depression as such and to what extent by something else, such as anti-depressive drugs. This is what we aim to answer, and particularly whether the duration of the use of antidepressants is connected to the person’s cognitive ability,” says Karrasch.

“Every medication study only last for four to eight weeks, so it is difficult to know what the long-term effects are. However, clinical studies do demonstrate that the risk of recurrence is greater for those who have used antidepressants than those who have been given a placebo.” For this reason, the project has two parts. The first part of the study will begin in the autumn of 2016 with 2,000 participants for their study.

“Why is that?”

“Mainly because a long placebo-controlled follow-up study would be very expensive and because the authorities do not require long-term studies in order to acquire a licence to put the pharmaceuticals on the market. Most clinical trials are carried out or financed by the manufacturer, and it’s natural to limit the trials to six week studies.”

“In 2016 the department of psychology at Åbo Akademi University will start a study on how continuous use of antidepressants affects cognitive functions. These include memory, concentration, perception, linguistic, arithmetic and executive functions. The study will mainly focus on working memory, a central guiding function enabling, for example, flexibility in problem-solving situations and the ability to simultaneously process various aspects of everyday life.”

“Drugs used in cases of acute crisis, there are many who have begun to question the long-term use of these antidepressants. This latter part of the study will start in the autumn of 2016 and will be made up of two parts. The objective of the first part is to explore whether there is a connection between the number of years a person has used antidepressants and the function of their working memory. The research is conducted in cooperation with the University of Turku in Finland, Swinburne University in Australia and Harvard University in the USA. The aim of the research group is to get 2,000 participants for their study.”

“In order to achieve such a large sample, the study is carried out on the Internet, using a web-based cognitive testing platform that has been developed within BrainTrain, an internal centre of excellence in research at Åbo Akademi University, headed by Professor of Psychology Matti Loime.”

“If the results turn out to show that those who have used antidepressants for a longer period have a weaker working memory, the question of the causal connection will still remain. Could it be the case that those who primarily have a weak working memory function are more inclined to be depressed and are therefore also more likely to start using antidepressants? This is an option and therefore a forward-looking research approach is also needed,” Karrasch explains.

“In the second part of the study new students will be recruited for conducting the same web-based questionnaire and working memory test. The results will be followed up after two and four years, in order to collect comparable data and potentially make it possible to answer the question of whether a weaker working memory capacity has existed prior to the occurrence of depression and the use of antidepressants. This latter part of the study will start in the autumn of 2016 at the earliest.”

Most clinical trials are carried out or financed by the manufacturer, and it’s natural to limit the trials to six-week studies.

Mira Karrasch.
A history in three parts of the 100 years of Åbo Akademi University will be published by its centennial year, 2018. The history will present a broad perspective on Åbo Akademi University and will also contain a number of in-depth studies based on issues that current historians are particularly focussing on.

TEXT & PHOTO: NICKLAS HAGEN

Åbo Akademi University was founded in Turku, Finland in 1917 and the university commenced its activities in 1918. The university’s centenary will be commemorated in 2018 with celebrations including the publication of a 100-year history. One part of this history will be a traditional synthesis, written by Nils Erik Villstrand, professor in Nordic history at Åbo Akademi. The two remaining parts will take the form of anthologies, one of which approaches the history of the university from the perspective of the history of science and ideas, while the other explores the relations-hip between Åbo Akademi and society. The former is edited by resear-chers Laura Hollsten and the latter by researcher Anders Ahlbäck and docent Henry Nygård; all the editors work within the department of history at Åbo Akademi University.

According to Nils Erik Villstrand, one aspect of working on this centennial history is to look at things that do not exist today. “As historians we should shift the focus away from teleology; things did not necessarily have to develop in the ways they have. We should point out the fact that there have always been alternatives and active subjects making specific choices. We mustn’t deny that many positive things have been done and something valuable has been created, but at the same time we will represent a critical perspective,” Villstrand says. According to him, the general overview will take the form of a good local history, saying something on everything. Villstrand’s aim is to situate the establishment of Åbo Akademi University within a larger context: the break-up of empires and World War I. In Russia the Tsar abdicated as a result of the February Revolution in 1917, which for Finland led both to independence and civil war. In the wake of World War I it was the trend in the entire academic world, but it is obvious that Åbo Akademi was very international at an early stage – perhaps even more so than later.

What is the significance of the 100 year anniversary of Åbo Akademi University?

What is the reason for this change? Is nationalism taken as a point of departure today, as something one moves away from by being international? Internationalism as such is not anything new. “Not at all. It’s just a question of naming and paying attention to the phenomenon, that’s the difference,” Villstrand says.

“Transnationalism is currently a buzzword within history research and the history of science, just as globalisation was a few years ago. But universities do have a national mission and nationality research has always been very important. While the tendency today is to decon-struct the nation, it has always been taken for granted that universities have a public duty, too. Today it is perhaps mainly a financial one, but also one of creating a basic identity,” says Hollsten. During its early years, Åbo Akademi was very international. In order to safeguard Swedishness in Finland, the university was very much oriented towards the other Nordic countries, a tendency which is still in evidence today in the names of some subjects within the humanities, such as ‘Nordic history’ and ‘Nordic folkloristics’.

Nils Erik Villstrand and Laura Hollsten.

So how was the theory of relativity received here at the university?

“Definitely as something one moves away from. It is not a popular theory today, although some might think otherwise. However, as with all theory, there are different levels of reception: There are people who study it, and people who study it with a ‘critical eye’,” Villstrand says.

What function will the history fulfill once it is completed?

“One defining factor is the small size. Subjects were small, and the fact that this was a small university meant that the professors is a very great extent set the tone and dictated the research profile of their subjects,” Hollsten says.

“Another factor is its Swedishness. This is a minority university in Finland, which meant that the orientation towards the Nordic region and Sweden was key, not least in the recruitment of staff. The Faculty of Theology has attracted personnel from Sweden to such an extent that we could call it a ‘Swedish diaspora’. Overall, the number of Swedish members of staff has been very large.”

Focus on internationalisation

“One issue that the history researchers pay attention to is the nature of international networks over the years. According to Villstrand, this is connected to the attempts on the part of present-day scientists to be good Europeans: “While it was previously taken for granted that researchers had contacts with colleagues that they found interesting, today we call it ‘internationalisation’,” says Villstrand.

Villstrand explains: “The university was to build the nation while also being at the fore-front within the world of science. It was like a donkey between two haystacks. The combination of these two aspects is an interesting ques-tion to explore.”

While the general part of the history is to say something on everything, the anthologies will contain in-depth studies of a number of narrow fields. In order to create focus an exclusive selection was neces-sary, according to Laura Hollsten, and therefore some subjects and faculties are not included in the anthologies at all.

This selectiveness is to a certain extent compensated for by the extensive background of the anthology authors. The history working groups include researchers and professors from the subjects of history, folkloristics, comparative literature, philosophy, sociology, informa-tion technology and chemical engineering at Åbo Akademi University.

“We’ll conduct various case studies asking how new knowledge emerges at a university and what the contributing factors are. One example being explored is the first Rector of Åbo Akademi, Edward Westermarck, his network, and specifically how the theory of relativity was received. In this case certain individuals are the objects of study, and therefore the narrative is not characterised by a broad perspec-tive,” Hollsten says.

Villstrand says: “The general overview is to say something on every thing. The university was to build the nation while also being at the fore-front within the world of science. It was like a donkey between two haystacks. The combination of these two aspects is an interesting ques-tion to explore.”

While the general part of the history is to say something on every thing, the anthologies will contain in-depth studies of a number of narrow fields. In order to create focus an exclusive selection was neces-sary, according to Laura Hollsten, and therefore some subjects and faculties are not included in the anthologies at all.

This selectiveness is to a certain extent compensated for by the extensive background of the anthology authors. The history working groups include researchers and professors from the subjects of history, folkloristics, comparative literature, philosophy, sociology, informa-tion technology and chemical engineering at Åbo Akademi University.

“We’ll conduct various case studies asking how new knowledge emerges at a university and what the contributing factors are. One example being explored is the first Rector of Åbo Akademi, Edward Westermarck, his network, and specifically how the theory of relativity was received. In this case certain individuals are the objects of study, and therefore the narrative is not characterised by a broad perspec-tive,” Hollsten says.

According to Nils Erik Villstrand, one aspect of working on this centennial history is to look at things that do not exist today. “As historians we should shift the focus away from teleology; things did not necessarily have to develop in the ways they have. We should point out the fact that there have always been alternatives and active subjects making specific choices. We mustn’t deny that many positive things have been done and something valuable has been created, but at the same time we will represent a critical perspective,” Villstrand says. According to him, the general overview will take the form of a good local history, saying something on everything. Villstrand’s aim is to situate the establishment of Åbo Akademi University within a larger context: the break-up of empires and World War I. In Russia the Tsar abdicated as a result of the February Revolution in 1917, which for Finland led both to independence and civil war. In the wake of World War I it was the trend in the entire academic world, but it is obvious that Åbo Akademi was very international at an early stage – perhaps even more so later.

What is the significance of the 100 year anniversary of Åbo Akademi University?

“Jubilees are a good reason to stop and reflect on why and how things have developed in a certain direction, on what we currently have and on the way forward. This is something every organisation needs,” says Villstrand.

“And not a single university history has been written without an anniversary. It just does not happen,” Hollsten points out.

What function will the history fulfill once it is completed?

“I hope that the anthology texts will be at a good level scientifically and also interesting to read, that they will be based on high-quality research and can be rewritten for publication in an international jour-nal on university or science history. Thus they could contribute to strengthen-ing the research environment on the history of science at Åbo Akademi University,” Hollsten concludes.

“We have managed to create new interest in the history of universities and have been able to attend conferences on the subject. This has had further impacts and strengthened both our own and other subjects.”

*2524*
Why is ice slippery?

When you are ice-skating you make use of friction in two ways – you glide forward and press sideways and outwards so that the blades of the skates cut into the ice in order to gain speed. But why do the skates glide so effortlessly on ice? Although this seems to be a simple question, it is only lately recently that physicists have been able to provide a satisfying answer.

“We haven’t really understood why ice is so slippery, and there still remain some unclear aspects to the question,” says Johan Lindén, lecturer in physics at Åbo Akademi University. He himself was once taught that the skate blade exerts enough pressure on the ice during skating to melt the topmost layer of the ice, but this has since been demonstrated not to be the case. Another mistaken theory is that it is the friction which melts a thin layer of ice and which is consequently diminished as the meltwater then functions as a lubricant. “There might actually be some truth in that explanation, according to Lindén, but it is not the whole truth.

Recently it has been discovered that the outermost layer of ice is always made up of a thin ‘quasi liquid’. The topmost layer has no neighbours above it, and thus the water molecules can move more freely. Lindén compares the phenomenon to the surface tension of the top bours above it, and thus the water molecules can move more freely. The topmost layer has no neighbours above it, and thus the water molecules can move more freely. Lindén compares the phenomenon to the surface tension of the top bours above it, and thus the water molecules can move more freely.

“A growth hormone – commonly used within cattle breeding in, for example, the USA, Argentina and Australia, has been demonstrated to affect the behaviour of fish in a way that might have ecological and evolutionary consequences. A low concentration of the hormone in water is sufficient to impact on the reproductive behaviour of fish.

Researchers at Åbo Akademi University, in cooperation with colleagues at, for example, Monash University in Melbourne, Australia, have found that the steroid 17β-trenbolone, used for enhancing muscle growth in cattle, changes the reproductive behaviour of guppies – also known as millionfish (Poecilia reticulata). Their research results have been published in the scientific journal Hormones and Behavior.

Dr Minna Saaristo, researcher in environmental and marine biology at Åbo Akademi University, is one of the main authors of the article. At the moment, she is stationed at Monash University.

“This steroid is part of a group of endocrine-disrupting chemicals (EDCs), which find their way into the environment along various channels, from household waste to farming discharges and industrial emissions. There has been increasing concern about these chemicals for the last few decades. The way in which they pollute and affect aquatic environments is a serious environmental problem,” says Saaristo.

These research results have for the first time shown that exposure to a quantity of the hormone 17β-trenbolone which is realistically found also in the environment – about 22 nanograms per litre – might be enough to negatively change the reproductive behaviour of male fish. It appears that male fish exposed to trenbolone stop courting female fish and instead use a so-called ‘sneaking’ strategy, where they sneak up behind the female and thrust in their sperm. This sneaking strategy is far more ineffective than the courting strategy and research has shown that female fish prefer male fish that perform a mating dance with them.

“Within the EU, trenbolone is banned in cattle breeding, but researchers in Denmark have measured high levels of the chemical in sewage water from farms, since it is a popular hormone among bodybuilders,” Saaristo explains.

Åbo Akademi University

Åbo Akademi University (ÅAU) is a multidisciplinary and an internationally acknowledged research university in Finland. Åbo Akademi University, with two main campuses in Turku/Åbo and Vaasa/Vasa, offers high quality education in Swedish and English for approximately 7000 students and has a very low student-teacher ratio - class size is often small and teachers have time to assist students individually. Around 1000 international students study and conduct research at ÅAU.

Internationalization is an important part of all activities at the university and ÅAU offers international master’s programmes taught in English. In a national comparison graduates of ÅAU generally have excellent employment prospects. ÅAU provides a unique, inspiring and international environment for research and education.

For more information, please visit www.abo.fi/en and www.abo.fi/master.
TURKU, THE OLDEST CITY IN FINLAND

combines small town distances with big city venues. Add 20,000 Scandinavian Islands, and you have an ideal setting for an unforgettable congress. Welcome to Turku - it’s a real treasure to discover.