

# Aurora

UNIVERSITY OF TURKU | 2005-2006



To Melissa, Robert and Antoine

the future  
lies in biosciences

# Aurora

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# Highlighting the international mission of the University of Turku



In its new strategy the University of Turku sets very ambitious goals for the international role of the University in the future. The University already plays a strong role in international level research in many scientific fields, and has been active in organizing international exchanges of students and teachers. On the basis of the new strategy, the internationalization of all activities of the university will be emphasized even more in the future.

## REALIZATION OF THE VISION THROUGH RESEARCH



The University of Turku recognizes five fields of strength in its research. The greatest of these is the biosciences. The other fields are the interaction of culture and society, mathematics, learning and education, and astronomy and space research. Although internationalization is emphasized in all activities of the University, the fields of strength are spearheads in the internationalization of research activities. The University coordinates 22 graduate schools, all of which offer training and supervision in English. The University has established fellowships open to young (less than five years from completion of Ph.D.) foreign researchers with a doctorate, who wish to come to the university.

The University supports international networking among its scientists and research groups to form strong consortia in their fields. Researcher-driven networking has taken place with partners all over the world. Southeast Asia and the Baltic Sea region have been the focus areas of administratively coordinated networking thus far.

## REALIZATION OF THE VISION THROUGH TEACHING

The University has carried out student and teacher exchanges within the frameworks of general European programmes, as well as bilateral contracts between dozens of universities in different continents. Every year almost 1500 foreign students take courses in our departments. On the basis of the new strategy, the University has founded international master programmes. All programmes are taught in English and many of them are joint degree programmes offered together with other European universities. These programmes give foreign students excellent opportunities to take a two-year master degree course in fields in which the University of Turku carries out top-level research and has a high international reputation. All the international programmes are aimed at offering scientific content of high quality, as well as an advanced pedagogic and pleasant learning environment.

## THE CITY OF TURKU, AN ATTRACTIVE MILIEU

Turku was founded in the 13th century and is the oldest city in Finland. The historic environment and numerous cultural services of Turku offer a warm and friendly environment for work and leisure activities. Turku is surrounded by the sea and one of the most impressive archipelagos in the world. Throughout its history, Turku has served as Finland's gateway to the west. It has excellent connections to the neighbouring countries and further afield. The environment in Turku has provided a good breeding ground for research-based industry. A rather high standard of living can be enjoyed at reasonable cost. Houses and flats are relatively inexpensive, and service organizations offer good quality housing for students at a reasonable price. The social and health care services for students have been excellently organized by the city. Turku is a good place to live for both students and senior researchers.



# Turku today

- lively student city surrounded  
by beautiful archipelago

Turku is often known for its history, but life in Turku is still dynamic. Turku is located in South-West Finland and it is bordered by a beautiful archipelago. Because of the sea, the climate of Turku is milder during the winter than it is in Central or Northern Finland.



Turku is a city of education. There are three universities in Turku: The University of Turku, The Turku School of Economics and Business Administration, and Åbo Akademi University, where teaching is mainly in Swedish. Turku also has Finland's largest polytechnic and many different upper secondary schools and vocational institutes.

Some people choose to study in Turku for practical reasons. The housing situation in Turku is quite good, and accommodation is easy to arrange. Because there are lots of students, student life is very active. There are different kinds of student parties every week for those who want to relax and meet new people.

Especially during the summer Turku offers a variety of events. For example, the rock festival Ruisrock, and the city festival Down by the Laituri, are held every summer. They bring young people together from all over Finland. The Middle Ages-style market happening, the Cathedral of Turku and Turku Castle offer plenty to see for people of all ages.

## STUDYING IN THE UNIVERSITY OF TURKU

The University focuses on the biosciences, on research into processes related to the interaction of culture and society, mathematical research, research on learning and education, astronomy, and space research. The University has about 18 000 students, and about 1000 of them are from abroad.

There are six faculties in the university: The Faculty of Humanities, The Faculty of Mathematics and Natural Sciences, The Faculty of Law, The Faculty of Medicine, The Faculty of Social Sciences and The Faculty of Education. The University of Turku offers many courses in English, and it also has several Master's Degree Programmes in English.

German student **Dominic Tolksdorf** studied in the university of Turku from September 2003 to September 2004. "I really enjoyed my time in Turku and in Finland. I met many people I'm still in contact with. I enjoyed the weather. It was nice to have a real winter and a

beautiful summer. I would recommend staying over the summer if at all possible."


Dominic took part in The European Studies Programme, which was multidisciplinary in nature. "I enjoyed the University, which offers its students really great studying opportunities. Most of the courses were of high quality, and it also should be noted that the university offers many courses in English, so it is a perfect place for exchange students. I also liked the Finns and their beautiful country, and their language, although it's really not the easiest language to learn."

Turku offers many alternatives to spend your free time. The Student Union and, for example, the Erasmus Student Network organize different kinds of meetings and parties. Nature and the beautiful archipelago are also close by.

"What I really liked was the ice-hole swimming, but sauna in general is the best thing ever. I also used the time to travel around Finland a lot. It's great with the student reductions on buses and trains."

"I enjoyed the University, which offers its students really great studying opportunities."





# The history of education in Turku goes back to the 13<sup>th</sup> century

**“In the middle of the 13th century, the Dominicans established the first convent school in Turku. In 1276, the Cathedral Chapter was established, and in connection with it, the second seat of learning, the Cathedral school, was founded in 1300.”**

Hannu Laaksonen’s doctoral thesis concerns Turku’s educational history. He says that the first school subjects were Latin, mathematics, church rituals and music. Later, also geography and Greek were taught. The convent school was closed in 1538, and after that there was only the Cathedral school in Turku until 1640 when the Royal Academy of Turku was founded.

International education in Turku has its roots in the Middle Ages. The Cathedral School students mainly travelled to West and Central Europe to study. “Paris and some of the German cities were the most popular destinations for Finnish students. Foreign studies were often a precondition for the post of teacher or vicar, or for membership of the Cathedral Chapter in Finland.”

The Royal Academy and the Cathedral school had hundreds of students, and student life was very lively. “At the end of the 18th century, the Academy of Turku was the most esteemed university in Sweden. Even when Finland was under Russian rule, the Academy had many privileges. The Royal Academy of Turku moved to Helsinki in 1828, because of the great fire of Turku in 1827.”

## FOUNDING OF THE UNIVERSITY OF TURKU

The University of Turku has an interesting history. The journalist **K.N. Rantakari** proposed the idea of establishing a Finnish-speaking university in Turku in 1911. Rantakari’s initiative started a public debate in the Finnish newspapers. The elite in Helsinki did not support the idea, but people in Turku and the surrounding regions gave a lot of support.

An extensive fund-raising campaign was held in 1918, the same year the Civil War broke out. The campaign reached its peak in 1919. Collections were made from door to door mainly in the countryside of Southern and Eastern Finland. Even though people were poor after the war, the campaign attracted 22 040 donors.

As a result of the fund-raising campaign, two universities were founded in Turku: the Swedish-speaking Åbo Akademi in 1918, and the University of Turku on 28th February, 1920.

Still today, the motto of the University of Turku is: “From a free people to free science and learning”. The motto refers to the founding of the University, which was based on the extensive cooperation of people in the young, independent Finland.



# Interpreting the Language of Cells

Cells talk to each other. Their receptors deliver messages that contain orders like: Grow! Specialize! Grow fast! or Die!

Learning to understand the language of the human cells is what keeps the researchers busy at the Turku Centre for Biotechnology (CBT). The cell papyrus and their hieroglyphics must be rolled up with great care. Interpreting the cell language, cell signalling, requires years and years of hard labour in the lab. The CBT offers researchers, post-doctoral, graduate and undergraduate students in Turku University, high level research facilities and an international network.

The Turku Centre for Biotechnology is a joint centre of the Finnish-speaking University of Turku and the Swedish-speaking Åbo Akademi University. The Centre is situated in BioCity, a large, modern building, glittering with glass, at the core of the Turku Science Park, which is one of the largest communities of experts in the whole of Finland.

Nowhere else in Finland will you find three universities plus polytechnic units, a university hospital, and about 60 biotech companies all within walking distance of each other. The biotechnological expertise in Southwest

Finland has its roots in the pharmaceutical and diagnostics industry that has been functioning in the Turku region for many decades. Nowadays, research and therapeutic use of biomaterials and functional foods have widened the spectrum.

The CBT technology infrastructure is also available to the new Turku biotech companies. Many companies also collaborate with research groups in the universities, facilitating translational research. The molecule's path from an idea to a pharmaceutical product is ten to fifteen years long. That is why the investors in this field have to be patient.

## THE KEY TO HUMAN BIOLOGY

There are 23 multidisciplinary and international research groups and about 180 employees within the CBT. The research groups share one particular interest: cell signalling. The receptors carry cell signals. To find the causes of illnesses requires an understanding of the information that the cells carry to each another.

Each human cell contains the human being's entire genome and all its genes. It is now possible to examine all the genes within a human cell simultaneously anywhere in the world. Now the researchers have the key which may open the doors of human biology.

The Turku Centre for Biotechnology houses an outstanding collection of key services and equipment for pursuing

cutting-edge research in cell, molecular and structural biology. The Centre started its work in 1989, moved to the BioCity building in 1992, and has built up a modern technology infrastructure for biotech research over the years. It has also educated a large number of experts.

## ACCESS TO MODERN TECHNOLOGY

"The Turku Centre for Biotechnology is now very well equipped. All the Turku Science Park researchers, whether they are from the universities or from the private companies, have access to the most modern technology like DNA-microarrays and proteomics technologies," says the Head of the Centre, Professor **Riitta Lahesmaa**.

The Centre provides functional genomics services like the Finnish DNA Microarray Centre, and Affymetrix and other commercial microarray platforms. The DNA Microarray Centre creates the prerequisites for new generation gene research in Finland; through bioinformatics, it benefits all Finnish research groups, and also foreign research groups use the services. The CBT also offers, e.g. the services of the Proteomics and Mass Spectrometry Unit and DNA Sequencing. The recently updated and expanded Cell Imaging Core (CIC) provides a state-of-the-art imaging facility to enhance both the research and teaching environments. CIC's capacity is also fully available to the whole BioCity Turku community.

# The Science of Understanding

***Melissa Junttila, Antoine Mialon and Robert Moulder work as researchers at the Turku Centre for Biotechnology. The scale of their home-lands, the United States, France and Great Britain is “somewhat” different from that of Finland, but in fact it does not make much difference where your lab is. In the Centre they have all the guidance and facilities they need. And, despite the cold winters, Finland offers a high standard of living and a good quality of – family – life.***

Melissa Junttila and Antoine Mialon are Ph.D. students working in a group focusing on MAP Kinases in Cancer Cell Signalling. Their group leader, Docent **Jukka Westermarck**, is a Senior Fellow of the Academy of Finland.

Robert Moulder is Senior Researcher in Professor **Riitta Lahesmaa**'s Molecular Immunology Group. His main interest is proteomics. Robert comes from Essex in Great Britain, and he studied at the University of Leeds. “After my Ph.D. at the University of Leeds I took a post-doctoral position at the University of Uppsala, Sweden, in 1992. Then, after the University period, I started to work as a researcher in Uppsala University Hospital. I was working with medical imaging analysis.”

After a number of years at Uppsala, Robert moved with his Finnish wife and children to Finland. He worked for a drug company first and then, in 2002, applied for a position at the CBT. “The work at the CBT was related to some of my research interests and expertise.”

## **MECHANISMS OF CELL SIGNALING**

Robert's work at the CBT has to do with characterizing proteins involved in cell signalling. “There is a large number of different techniques involved in this. My speciality is with mass spectrometry and related sample preparation and separation methods. I have been identifying proteins and protein expression changes with immunological response.”

Like Robert, Antoine Mialon arrived in Turku in 2002. And just like Robert, he had a practice run in another Scandinavian country first. For Antoine it was Norway and Bergen, where he studied as an Erasmus exchange student. Originally, Antoine comes from Normandy in France. “I started my studies at the University of Caen and did my Bachelor Degree as an exchange student in Bergen, where I met my future wife, who was a Finn also studying as an Erasmus student in Bergen. We decided to stay a bit longer: I studied marine molecular biology and she did her teacher studies in Bergen.”

Antoine's wife had to complete her Finnish literature studies in



Turku so they moved to Finland. Antoine wrote his Master's thesis and applied for a Ph.D. position in the Turku Centre for Biotechnology. "In Jukka Westermarck's group, we are working with protein complexes in the context of cell signalling. We are purifying protein complexes and analysing their role in cancer signalling."

For Antoine's work at the laboratory it is important to understand a certain transcription factor, c-Jun, and its molecular mechanisms in the regulation of cancer cell growth and survival.

## PROTEIN COMPLEX PURIFICATION

Melissa Junttila first arrived in Turku as an exchange student from Chicago in 1999. During her exchange year in Turku she studied social policy and social medicine. In the U.S. she graduated from the University of Southern Illinois, Urbana-Champaign.

"I was originally supposed to be here for a few months but I got a job in BioCity working as a part-time researcher in the plant physiology laboratory."

"It was one of the coldest winters and I was pretty shocked and did not know what to do with my spare time. I had been doing research during my Bachelor's Degree in the U.S. as well. When my exchange year ended, they asked me to continue my work in the laboratory and that's where I met my husband. I did my Master's thesis at the University of Turku in an international programme. In 2001, I started working at the CBT and I am actually part of both Professor **Veli-Matti Kähäri's** and Docent Jukka Westermarck's groups."

"Our main interest is finding out what is the difference between MAP kinase signalling, cell signalling between cancer cells and normal cells. Our aim is to find out where the change has occurred, a change that is an important cause of cancer. The cells have so many mechanisms with which to prevent cancer but somehow they all seem to get irregularated.

We are trying to find some link, whether a protein or some signalling mechanism that we can interfere with, in order to, perhaps, reinstate normal signalling with which we can kill the cancer cause. My speciality is protein complex purification, trying to find important proteins in cancer, and what other proteins are interacting with them."

## EDUCATION SYSTEMS AND SCALES DIFFER

For Robert Moulder, moving to Scandinavia meant different surroundings from those at home. "Scandinavian countries are much less densely populated, a lot more peaceful and cleaner compared to Great Britain. I found the CBT a very friendly place."

Besides the difference in scale (the population in the U.S. 260 million, Great Britain 60 million, and Finland only five million), a big difference between Great Britain and Scandinavia is the education structure. To complete a Master's degree in Finland takes much longer than in many other countries. Finnish students can even have babies while they study because the social care is on such a high level and you are allowed to study longer.

Also the number of students attending lectures is totally different. According to Antoine:

"Whereas in France we had 200 people attending a lecture (Melissa: "or 800"), in Norway, there were maybe 20 people. The competition for promotion is greater in France."

"The system in Scandinavia is protectionist," says Antoine. "If you do not speak the language, it is difficult to get into the system. You have to find out a lot of things for yourself. For instance, to write a grant application is hard if you do not have anyone to help you. It is not very well explained for foreigners. Of course, at the same time, as a Frenchman I defend cultural exceptions."

## SAFETY AND SOCIAL CARE BIG ADVANTAGES

One big difference for Melissa was the safety. "If you are living in a big city in the U.S., you are constantly aware of your wallet and your coat. And when I came here everybody left their coats downstairs and walked upstairs to the library. And here as a woman you can walk home even at two o'clock at night. You forget how nice it is to live here in those ways."

"I was also very surprised by the social security benefits. In the U.S., you pay even tens of thousands of dollars a year for your university education. You do not take seven years to finish your degree, because you cannot afford it. There is pressure to graduate as fast as you can. I had three jobs just to earn money for my studies."

"The quietness of people in the lab was at first a shock to me. I thought that all people hated me, because people in Finland do not speak to you first. Now I understand it completely and I am probably very Finnish-like in my behaviour."

The future for all three is open and depends of course on their personal life, on family decisions. Melissa, Robert and Antoine would all like to see themselves in the biotechnology sector, whether at a university, in a private company or in a university hospital. Robert would like to have his own applied mass spectrometry research group and Melissa would like to see herself working in the cancer field.

"Maybe in ten years we might actually see where the investments in biotech and biomedicine have led us. The lines between academia and the private sector have faded and I believe we will see much more cooperation in the future," she says.

Melissa Junttila, Antoine Mialon and Robert Moulder taking a look at a protein x-ray picture in the laboratory. They say that you get integrated into the Finnish way of life and create your network by becoming involved in hobbies after working hours. All three work at the Centre for Biotechnology in Turku, which is a joint centre of two universities in the middle of the Turku Science Park.

# The magic of bioglass

**A good example of nano-research in Turku is bioglass. Its early history goes back to the 1970s, when Antti Yli-Urpo, who was later appointed the Professor of Prosthodontics at the University of Turku, did his doctoral research on the combining of tooth gold and ceramic materials. The aim was to find materials that would irritate the tissues as little as possible.**

Yli-Urpo began to wonder whether the issue could be turned around, and began the search for materials that would not only not irritate the tissue, but would actually help it regenerate itself. The idea was left to incubate until the 1980s, when funding for further research became available. Bioglass had already been researched in America, but there had been no results worth mentioning. Then Yli-Urpo's co-operation with an Åbo Akademi University Chemistry Professor, **Kaj Karlsson**, led to success. Co-operation has continued with Professor **Mikko Hupa**, and it has produced several international breakthroughs in the development of bioglass and fibre composites based on it.

Bioglass is really glass – mostly silicon and phosphate. The special quality of bioglass is that its surface interacts with living tissue. It also rejects bacteria and generates new healthy tissue.

## STAGGERED NANO-MOUNTAINS

Professor **Pekka Vallittu** from the Turku Institute of Dentistry's Department of Biomaterials Science and Prosthodontics and Adjunct Professor **Heimo Ylänen**, director of the Turku Biomaterials Centre explain that although the behaviour of bioglass was known, it was only the complete understanding of the phenomenon that brought us to the field of nanoresearch.

They explain that it is a question of the chemical composition and the "topography" of the bioglass surface.

The bioactive surface consists of bumps, much like mountain tops, at a nano-scale distance from each other. The distance is such that organic systems, from the minerals in bone to soft tissue, like it and stick to it. A chemical bond, like a strong organic "glue", is formed.

During this reaction, bioglass releases calcium, sodium, phosphorus and other ions, and the system is alive. "The glue layer advances continuously, the bioglass itself disappears, and new tissue is formed from the 'debris'", explains Ylänen, describing the magic of bioglass.


Bioglass is an excellent filling or coating, but it cannot be used in places where mechanical strength is needed. Thus, the Turku Biomaterials Centre developed a method in which titanium is coated with a bioactive coating, thus making it possible to organically bind titanium implants to soft tissue.

A project of the Centre for Biotechnology - the objective of which is to make this system that already functions on a titanium surface work on a polymer surface as well – has already been submitted for inclusion in the new National Technology Agency's (Tekes) nanotechnology programme. Pekka Vallittu's research groups specialise in developing different fibre composites that can be given the desired strength, flexibility, and other characteristics. This opens up completely new possibilities in the treatment of damaged tissue, bone fractures, etc. Modelling is used in the customising of the materials, so co-operation with, for example, mathematicians and physicists is needed.

## INTELLIGENT IMPLANT

"The next step in our research is the so-called intelligent implant", explains Vallittu. A project that aims at developing a new kind of implant is being started with lecturer in medical physics **Erkki Hiltunen**. A composite implant that is placed inside the bone has sensor-like nanofillers. They send out signals that can be read. The idea is that a large endosteal prosthesis, for example, can immediately send out a message when the load from walking or running grows too great. Such materials are so-called third generation biomaterials.

In the beginning this will help in diagnosing the situation at the bone/implant interface. Later the aim is to integrate the implant into a living organ, so that the organ itself can perform the necessary corrective actions. These are visions for the future. "But not a very distant future", Vallittu reminds us. "Expertise in artificial nerves already exists in Finland."



“Bio composites can substitute for severe skull damage,” say Pekka Vallittu and Heimo Ylänen.

TEXT TIMO NIITEMAA | PHOTO VESA-MATTI VÄÄRÄ

## The mathematician and the DNA computer

**Mathematics as such is not tied to the size of an object; its realm reaches from the infinitely small to the infinitely large. The mathematician can use nano-class information on the double helix structure of DNA and apply it mathematically in solving problems of design.**

Mathematics Professor **Juhani Karhumäki** and researcher **Tero Harju** leave the layman gasping for breath when talking about *abstracting problems, modelling and making use of the self-assembly phenomenon*. Ultimately, it is a question of presenting the molecular-level information-processing which occurs in nature mathematically, and on the other hand, using it in the construction of a type of DNA computer.

The DNA computer is based on the cooperation of biologists and

mathematicians. The biologist provides the starting point by finding out how information is materialised within a living cell. Then the mathematician steps in with modelling. Tero Harju was one of the authors of a book, *Computation in Living Cells*, which was published internationally last year and discusses the connections between computation and biology.

### NANO DOMINOES

One concept that connects mathematics and nature is the self-assembly theory. One of the leading researchers of this theory internationally at the moment is Mathematics Professor **Jaakko Kari** from the University of Turku. Self-assembly means a complex phenomenon in which small particles combine together automatically to form a larger functioning system. This phenomenon is common in nature. One example of this could be rectangular blocks that only join on certain sides, like dominoes. The question is, can such blocks fill a certain pattern. DNA strands can also be used as blocks in the self-assembly theory, which leads us to completely new nano-applications.

Karhumäki explains that the strength of the DNA computer lies in its potential capability to perform a large number of simultaneous processes in a very small space. Problems that could be solved using this approach are, for example, problems in logistics and designing circuits, in which the most economical routes along which to build all possible connections are sought. In theory, it is already possible to construct a DNA computer, but we are still a long way from a functioning solution.



Professor Juhani Karhumäki (second from the right) and researcher Tero Harju (third from the right).



# Asia is more than

“In the media and in public discussion, Asia has become a real issue only now in the 21<sup>st</sup> century because of all the talk about the “China Syndrome” and all the other topics that are mostly related to economics.”

Klaus Mühlhahn

## Who?

- studied Chinese Studies at the Free University Berlin and Taiwan National University
- before starting in Turku in August 2004, served as Assistant Professor for Chinese Studies at the Free University Berlin
- from 2002 to 2004 did research at the University of Berkeley in California, United States, as a Visiting Fellow

Look for more information on current lectures and courses at <http://aasia.utu.fi/> and at the web pages of the Department of Contemporary History <http://www.soc.utu.fi/polhist/muhlhahn/index.htm>



# mere economics

Professor **Klaus Mühlhahn** is the key actor in academic Asian education at the University of Turku. He came to Turku because in Turku it was possible for him to create something new and establish an innovative and dynamic field of Asian Studies. The first result of these efforts will be the founding of a new Centre for Asian Studies at the University of Turku in autumn 2005. It will provide the basis for a further expansion of Asian studies.

At the Department of Contemporary History, Klaus Mühlhahn directs a comprehensive and diversified teaching programme on modern and contemporary East Asia, using textual as well as visual sources to make students from all disciplines familiar with the characteristics of East Asia.

Klaus Mühlhahn considers education about Asia essential, especially in today's world. Even though European countries and the U.S. have a background in academic Asian education, generally speaking, Asia is still relatively unknown in the West.

"The great thing is that nowadays both Europe and the U.S. are really trying to form a connection with Asia, and trying to have a dialogue and cooperate with it. Cooperation is a key element in the globalized world."

## ASIAN CULTURE HAS A LOT TO OFFER

In order to have a dialogue and to cooperate we have to understand each other. That's the main reason why Mühlhahn considers education about Asia-related issues important.

"The essence of working together is related to values. In a globalizing world, everyone's actions affect everyone else's. In a way, all the global actors are in continuous discussion about values with each other."

Asia and the West do share some values; otherwise the already existing widespread cooperation would not be possible. But, there is also much to be learned in both directions. According to Mühlhahn, people often think, for example, about China only in economic terms.

"Economics is of course an important issue, but China is a lot more than just economics. Another important issue is, for example, China's achievements in science, especially in the fields of computer sciences and biosciences."

Asian culture is another important field. Asian culture is often seen as exotic in the West, but, in addition to exoticism, it has much to offer. Instead of just looking at Asian culture, there's a lot for westerners to learn.

"Western civilization has a history of being very willing to teach others. I think it might also be very useful to try to learn from others. An example of what might open up different views in European thinking could be the anti-materialism and group-orientation of Asian cultures."

## National University Network of East and South-East Asian Studies

The University of Turku joined the national university network of East and South-East Asian Studies in 1998. Three years later, in 2001, the Department of Contemporary History took over responsibility for coordinating the network. Klaus Mühlhahn is chairman of the Board that oversees network operations.

The network includes all the Finnish universities. The goal of the network is to make Asian education in the network's universities available for all, and to enrich Asian education through the cooperation.

The network coordinates East and South-East Asian education at both basic/intermediate level and at master level. The East and South-East Asian Studies network is responsible for the Asian Programme and the Advanced Studies entity. The Asian Programme offers basic knowledge about East and South-East Asia. The Advanced Studies entity is multidisciplinary. Courses vary from cultural history, social sciences and business to media studies. It consists of master-level education, and it supports the students writing Asia-related theses.

The Asian Programme is available not only for universities but also for Finnish polytechnics. The education in the Asian Programme takes place in a virtual environment. It consists of essays, online-teaching, online lectures and home exams, which are delivered to the teacher via the internet. The programme had 320 students in 2005.

The University of Turku also arranges researcher education which is separate from the network. Researcher education started in 2002 when six postgraduate students were accepted. The first doctoral dissertations are expected to be ready in 2005.

**For more information, see: [www.asianet.fi](http://www.asianet.fi)**

# Justice for the environment

**Who owns the environment? Who gets to decide where a waste incineration plant is built? Who is responsible when oil ruins the seashore? Can we affect the decisions that affect our environment? Anne Kumpula is a professor in environmental law, whose field is in the headlines often. Environmentalism has brought the need to understand the judicial mechanisms connected with environmental questions.**

The importance of environmental law will continue to increase in the future. The field has its roots in land law, water rights legislation, land use planning, water planning and real-estate planning, and in the need for expertise in these fields. Finland has had environmental protection regulation since the 1920s.

## THE ENVIRONMENT, AN ISSUE IN MANY FIELDS

The field is connected with social sciences, such as environmental sociology and environmental policy research, and natural sciences, such as environmental science, biology, geology and biodiversity research. The field of medicine is also involved, as the well-being of the environment also includes the well-being of its inhabitants.

“People’s health is of central importance in environmental protection regulations” says Professor Kumpula. “The division of the sciences is easy to recognise in environmental research, the academic language becomes specific for each field. However, usually the students are brave, and search for information from different fields.”

Environmental questions are fundamental and genuinely global, not only local. Many human sciences perceive these questions through environmental philosophy.

“How moral issues brought up by environmental philosophy – relate to environmental issues raises completely new questions. Does nature have intrinsic value? Should it be protected for the sake of humans or for itself?”

“In their Master’s theses, students discuss the central issues through environmental themes. For example, urban nature is discussed: what natural elements can we find in our asphalt environment, and what does protecting nature mean in urban areas?”

## COMMERCIAL LAWYERS MUST KNOW THE ENVIRONMENTAL REQUIREMENTS

Environmental lawyers are increasingly employed not only by the state administration, but also by companies.

“Companies value commercial lawyers who master environmental matters. Law firms specialised in environmental questions are also emerging in Finland. They already exist in the United States and in Central Europe. Commercial lawyers must be familiar with the basics of nature conservation; they must recognise what environmental requirements are placed on operations and production.

“As law students study more and more environmental law, they see that ‘nature’ is not just far away in national parks, but that we are faced with the question in the company’s everyday decisions.

“Some of the larger companies – and we must not be too optimistic here – have adopted voluntary environmental audit systems. There

are many industries in Finland that are fully based on environmentally-friendly operations. A good example of this is tourism. Ecological viewpoints are increasingly taken into consideration in tourism. For example, in hotels, towels are not washed daily, unless the client insists on it. Naturally, the forest industry is also dependent on these issues, but the requirements for environmental protection are also increasingly moving into the service sector.”

## ENVIRONMENTAL CHOICES ARE EVERYDAY DECISIONS

Anne Kumpula assumes that people feel rather hopeless when faced with the big questions, like climate change and the extinction of species. There is, however, something that allows everyone to contribute, namely, everyday actions.

“Nowadays people as consumers pay more attention to the environmental friendliness of products: does the product have an eco-label and from how far away has it been transported. Thus, an environmental problem, consumption, can also be a way to be environmentally conscious. Recycling waste paper and glass is an everyday environmental action.

“If we think of urban or area planning, we can see that the routes and schedules of public transport have a great significance for how people are encouraged to use them. These are very concrete questions. Aside from EU and UN decisions, in everyday life we need people who check how many layers a product is packed in.”


## LOCAL PROBLEMS BECOMING GLOBAL

Environmental questions are nowadays rarely only local problems anymore. The energy company Fortum has an oil refinery located near Turku, in Naantali. The refinery had an oil spill in December 2001. Some of the oil passed into the sea, and some of it came ashore at the Ruissalo nature reserve, and spoiled the island’s beaches. The matter came to court in the spring of 2005.

“The Baltic Sea is an excellent example of how local environmental problems easily spread to involve many other states as well. The Baltic Sea is the common basin for all the Baltic Sea states, the Nordic Countries, Russia, and the Baltic Countries, Poland and Germany. We have shared natural resources, so local actions affect us all.”

Kumpula defines the great questions in environmental law as climate change and the decline in biodiversity. “While they are genuinely big challenges, they show very clearly the limits of judicial regulations and possibilities. It all comes down to politics. If governments will not take the Kyoto Treaty seriously, its goals will remain good-will gestures, declarations.

“These are processes in which quick solutions and the

A close-up portrait of Professor Anne Kumpula, a woman with short brown hair, looking slightly to the right of the camera with a gentle smile. She is wearing a dark blue top and a necklace with a large, textured, light-colored pendant. The background is a blurred, textured wall.

implementation of change is regrettably very difficult, if not impossible. It might take decades before internationally binding norms are established.

“One of the fastest processes was the protection of the ozone layer. It took eleven years to achieve an international treaty after the detection of the depletion in the layer. It was a very long process for the climate change to become a genuine social problem and an international concern. Pollution occurs gradually, and the end result is something no one expected. We should find some key themes to bring about change.”

## **HOW IS REPRESENTATION IMPLEMENTED IN DECISION MAKING?**

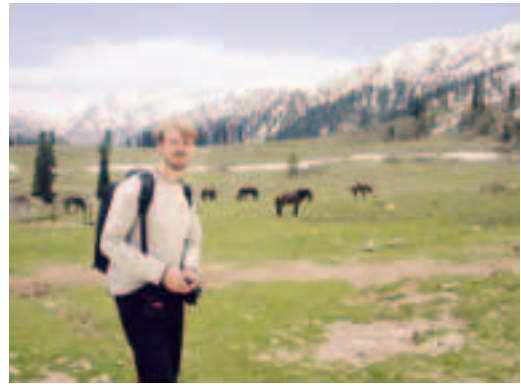
Decision-making procedure and, on the other hand, the regulation of local matters should be made more diverse, democratic and efficient. Law-making requires huge amounts of knowledge and, for example, energy decisions extend over generations. We need as many viewpoints and grounds as possible when making decisions. ‘The council of the wise’ should consist of as many voices as possible.

“We have begun to wonder how environmental democracy is realised in our own living environments. And about how participation in wider, European decision-making is realised. How can any of us influence legislation concerning, for example, genetically modified plants? These are difficult questions.”

The significance of civic organizations as international actors has grown, and some of them have become very professional.

“Organizations have their own goals and ambitions. At the same time they are separating themselves from ‘us’ and thus are not necessarily representative. It makes one wonder how the ordinary person’s ordinary opinions are communicated across to them. Thus, we should find ways to improve democratic representation in the preparatory stages of decision making. Organisations are not necessarily representative of an area’s residents, but rather independent actors.”

Professor Anne Kumpula says that attempts have been made in the preparatory stages of law-making to create procedures for hearing civic organizations and experts. Environmental questions are generally always full of tension, and may lead to conflicts because they touch so many actors.



*Director of communications Tommi Laulajainen in Kashmir where he was filming a documentary about the work of the organization, Doctors Without Borders, in 2002.*

## Director of communications without borders

Tommi Laulajainen, a graduate of Turku University, is the director of communications at the Canadian office of the organization, Doctors Without Borders. He obtained his current job due to his extensive knowledge of languages acquired during his student days and his experience of field work in Unicef missions.

Laulajainen's job description in the MSF (Médecins Sans Frontières – Doctors Without Borders) covers everything related to internal and external communication. Most of his time is spent on marketing communications and working with the press. "We produce various publications, videos and Internet productions, and it brings variety to my job," he says. Once a year Laulajainen participates in field work to collect photographic, video and Internet material related to different MSF projects.

"The goal of the MSF in field work is to provide healthcare services for those in need, whether there is a state of war or some other crisis," states Laulajainen. For example, in Afghanistan it was a deliberate decision of the MSF to initiate projects in the areas that were controlled both by the Taleban and its opponents. Impartiality and maintaining the image of impartiality in a state of war are extremely important for the organization. It helps to reach people suffering in the middle of a conflict, whichever side of the front line they are on. Laulajainen describes the MSF as a very self-critical, democratic organization, with a culture that includes lively debate. "Frankness and strong opinions are part of the organization's culture. This guarantees that every day is as challenging as the previous one."

### FIELD WORK BROADENS ONE'S WORLD VIEW

Laulajainen graduated from the University of Turku, Faculty of Humanities, in 1989. After that, he ended up doing PR work for Unicef in the Congo for two years. Until November 1997 his work continued in Afghanistan, Papua New Guinea and the Unicef headquarters in New York where he worked on various projects in the field of communication. "At the time I was already aware of the MSF, and when I moved to Canada in December 1997, the organization was just recruiting a director of communications," states Laulajainen.

His background in communications, his wide experience of field work and strong command of English and French helped him in his application.

According to Laulajainen, he has learned a lot from the challenges and problems in the humanitarian field. "My world view has always been very global, and in field work I have learned to appreciate and respect people, irrespective of their origin, colour or religion," explains Laulajainen. He considers himself especially lucky because he has had the opportunity to work in many countries and cultures, and on top of that as a part of organizations whose values and work he personally appreciates.

### A SOLID FOUNDATION FOR KNOWLEDGE AND SKILLS

Working in Unicef and specialized courses related to marketing communications have taught Laulajainen a great deal about communication in the field of health care. "The MSF has ongoing projects in 73 countries, and even though I don't have to know everything about these countries, I must have a fairly good understanding of the MSF operation in them. This is very important when working with the media. My job requires good negotiation skills and the ability to sell ideas," he claims.

Laulajainen studied at the department of translation studies, and it gave him a solid foundation for a good knowledge of languages. "I am sure that the fact that I was chosen for my present job from a group of over a hundred applicants who were native English speakers, says something about it. Personally, I am very satisfied with the education, knowledge and skills that the University of Turku provided me with. I don't know how the University of Turku and other Finnish institutions of higher education compare internationally, but my own experience has been positive," he insists.

# Language and the internet



*The writer is senior research fellow (Academy of Finland) at the Department of English.*

The effect of the internet on interaction between people has been remarkable, and it would be difficult to imagine today's world of communication without computer-mediated interaction (such as e-mail, chatgroups, instant messaging, SMS). In online communication, interaction is possible regardless of the distance between the communicators, and opinions

can be distributed with relative freedom and ease. The novel features of emergent electronic communication channels both enable and require new linguistic practices.

The Interaction Research Group at the University of Turku studies the patterns and practices of online communication. The research carried out by the group is informed by current trends in computer-mediated discourse studies. We pay attention to conflict and argumentation strategies, on the one hand, and interaction management and politeness strategies, on the other. In addition, we bring in the perspective of plurilingualism by studying the use of three different languages (English, French and German) as lingua francas. More specifically, we are interested in topics such as the following:

- English, French and German as lingua francas on the Internet in the plurilingual European society: what are the characteristics of computer-mediated lingua franca?
- How do writers manage their relationship with the

distant other in virtual discourse communities?

- How are disagreement and conflict negotiated in computer-mediated discussions?

On the basis of pilot studies, it seems that communicators in an intercultural (lingua franca) situation are extremely sensitive to interpersonal relationships. Failing to show consideration for the other communicators may lead to confrontation, even flaming (i.e. aggressive behaviour towards other communicators, such as sending hostile messages). In online lingua franca communication, writers consequently have to have the ability to cross various cultural and linguistic borders in order to have a successful interpersonal relationship with the distant other.

In today's Europe (and even more globally) it is important to understand the patterns, practices and possibilities of online communication. Transnational by definition, computer-mediated interaction connects people from various cultural and linguistic backgrounds, and it is essential that we strive to analyse and explain how language and communicators adapt to yet another medium, the internet.

## **IRG**

**Interaction Research Group  
University of Turku**

### Senior members:

Marja-Liisa Helasvuo (Finnish)  
Marjut Johansson (French)  
Sanna-Kaisa Tanskanen (English)

### Junior members:

Johanna Karhukorpi (English)  
Juulia Kurittu (French)  
Mia Raitaniemi (German)  
Department of English  
Department of Finnish  
Department of French  
Department of German

[irg@utu.fi](mailto:irg@utu.fi)

The Interaction Research Group was founded in 2002 to promote cooperation between researchers working on language and interaction at the University of Turku. The members of the group study face-to-face and mediated interaction (especially computer-mediated interaction) from various perspectives.

Through its postgraduate training, research and related teaching activities the group hopes to make a contribution towards a better understanding of the relationships between language, culture and society, which is one of the focuses in the research strategy of the University of Turku.

**TURKU PET CENTRE:**

# number one in its field

**The national PET Centre in Turku carries out top-level international research in the field of imaging. The centre allows the use of the latest equipment in diagnostics and treatment of patients as well as for research. The PET Centre – run by the University of Turku, Åbo Akademi University and the Turku University Hospital – is the best in its field in the world. The Centre has four dedicated PET scanners, one MRI scanner and, as the latest addition, a PET/CT, which gives researchers and doctors even more detailed information. The Centre provides services for all Finnish hospitals.**

In recent years the PET Centre has been building its infrastructure in the direction of a more comprehensive research and treatment chain. PET, or positron emission tomography, refers to a medical imaging method which can be used in research and clinical care. The target is scanned in slices. Combining and modelling the slices gives a measurement of the target's function.

## **PAINLESS AND ACCURATE**

For a PET scan, minute amounts of a radioactive tracer substance are introduced into the subject's bloodstream. The camera then follows this tracer. The examination is painless and the amount of radiation received is comparable to that received from an X-ray studies. The PET scan uses tracer substances labelled with short-lived radioisotopes.

The PET scanner can image organ functions, cellular metabolism, blood flow, oxygen and energy consumption and the function of neurotransmitters. It provides means for observing how medicine is delivered into tissues and the effect of even very small amounts of a drug. Thanks to the technology animal testing can be reduced and drug development accelerated. The progress of cancerous cells can also be seen with the help of a PET scanner, as well as the effectiveness of treatments.

"Yesterday, we installed a new PET/CT scanner, which is used mostly in imaging of cancer patients. It is a new generation multi-slice scanner, a combination of a PET scanner and computerized X-ray tomography, which is used in clinical care. It provides us with anatomical and PET information simultaneously. The unit also provides means for contrast medium imaging of the coronary arteries, a non-invasive tool for coronary angiography," explains the director of the Turku PET Centre, Professor **Juhani Knuuti**. "Both parts of the unit – the PET and the CT – are of excellent quality. The CT unit is a 16-slice system, which will be upgraded to a 64-slice system early next year, thus further improving the quality of information. The PET part is also a new generation device. This kind of equipment

does not yet exist anywhere else in the world yet. The Turku PET Centre will act as a reference centre, and we receive all the latest upgrades and software for the unit."

## **FOR BOTH CLINICAL TREATMENT AND RESEARCH**

"Most of the patient imaging ordered by physicians on a clinical basis is done on cancer patients, so we examine the spread of the cancer and assess the effectiveness of the treatment. With some cancers we need exact knowledge of the spread of the cancer to support the treatment decision. Information is also needed when it is suspected on the basis of blood work, for example, that the disease has recurred," explains the Professor.

Half of the time reserved for research purposes is used for brain imaging. One third is heart and metabolism research, and the rest is, for example, scientific research on cancer patients.

There are altogether 111 persons working at the Turku PET Centre, both centre employees and researchers financed by external funding.

"To enable PET research the whole chain has to work properly. We have a new nuclear accelerator, or cyclotron, owned by Åbo Akademi University which began working a month ago. In addition to this, we have a 'baby-cyclotron' which only produces oxygen-15 isotopes. This makes it flexible to produce for example radiowater and radioactive oxygen gas."

"In addition to the accelerators, we have had ten new synthesis systems, which we call hot cells, built in our basement. They are lead-shielded cabinets in which the tracer synthesis takes place. They will be taken into use this autumn. The equipment is being validated in accordance with the new GMP quality system regulations. In addition to these, we have acquired our own 1.5T MRI-scanner."

"We've just about grown enough, we have the capacity," says Juhani Knuuti.

*The National PET Centre is top-class by international standards. "As far as resources, publications and production are concerned, we are at the very top. We have done very well, and we aim to keep it that way" says PET Centre Director, Professor Juhani Knuuti.*

**“ Yesterday, we installed a new PET-CT scanner, which is used mostly in imaging of cancer patients. It is a new generation multi-slice scanner, a combination of a PET scanner and computerized X-ray tomography, which is used in clinical care. ”**



“The bottleneck is not the equipment or the facilities, but getting them both to be used efficiently. The problem has to do with training and employment, as we need just the right kind of people.”

For its part, the University of Turku has reacted to the need by initiating education in radiochemistry with the help of an externally funded chair and Professor **Olof Solin**.

## **INTERNATIONAL COOPERATION**

The Turku PET Centre signed a partnership contract with Amersham, a radiopharmaceuticals producer two years ago. The company is nowadays a part of the healthcare giant GE Healthcare. In the contract, the Centre committed itself to selling its services to this global company. For the Centre, the deal guaranteed partial investments in new scanners and cooperation with the international enterprise. At the same time Turku Imanet Oy, which is a GE Healthcare-owned company in Turku, was founded.

The majority of the shares in corresponding PET centres in Uppsala and London are owned by GE Healthcare. In Turku, the solution was a partnership, not ownership. “Although we are strongly committed to cooperation, we are a completely independent actor. A research facility must be able to do long-term work that will not always necessarily produce a profit and is not tied to fiscal quarters. For us, selling scans is a way to obtain resources for research. At the same time, we can be the first ones to use completely new radiotracers in research. GE Healthcare benefits from having our imaging expertise at their disposal and we benefit by getting into the new tracer library,” states Knuuti.

## **RESEARCH FOCUS DEFINED**

“Our host organizations, the University of Turku, Åbo Akademi University and the Turku University Hospital, have been very committed to developing the centre, but the research teams get their own external funding.”

“In our basic research strategy we have defined our research

focus as being on neurotransmitters, metabolism and pharmaceuticals research. The choice is based on what our methods are best suited for, where the most benefit can be found and where we have the strongest experience and results.”

Juhani Knuuti still does his own research. “I find it important, because if I find myself sidetracked from my research, it is a bad thing for the centre.”

Knuuti studies the regulation of myocardial perfusion and metabolism. He and Professor **Pirjo Nuutila** have a common research team.

“At the moment I am researching the imaging of vulnerable plaques, i.e. plaques prone to rupture. Coronary artery disease creates plaques in the arteries. A sudden coronary event, like a myocardial infarct, is caused by a plaque rupturing. Our goal is to find an imaging method to image these vulnerable plaques. Thus, potentially we could also guide treatment practices. We are talking about a long-term project, which will take several years, and now involves ten persons.”

The Turku PET Centre has its thirtieth anniversary this year. The first accelerator was acquired by Åbo Akademi University in 1974, and a related cyclotron project began the following year.

# What is the Turku PET Centre?

The Turku PET Centre is a Finnish national research institute for promoting the use of PET in medical research. The Centre was founded in 1974 by the University of Turku, Åbo Akademi University and Turku University Hospital.

The Centre integrates top scientific expertise with excellent facilities and equipment located centrally on the university campus and in the university hospital. Fruitful interaction and collaboration between scientists and clinical investigators is a long-standing tradition.

The researchers at the Turku PET Centre are working on the development of new radiotracers, with experimental, preclinical and clinical studies on new compounds and drugs, as well as performing clinical investigations. The location of the Centre in the University Hospital allows the Centre to study severely ill patients. The facilities of the Turku PET Centre currently include the cyclotron laboratory, the radiochemistry laboratory, the preclinical laboratory and the PET imaging laboratory. The Centre resources include four PET scanners, one PET/CT scanner and one MRI scanner, one digital ultrasound device, three cyclotrons and 16 radiotracer synthesis sites. It employs a staff of 111 people, including researchers.

# What is PET?

Positron emission tomography (PET) is an unsurpassed method for imaging human biochemical and physiological processes in vivo.

An unlimited number of natural substrates, substrate analogs and drugs can be labelled for use with PET. This labelling does not change their chemical or biological properties.

Minute amounts of biologically active compounds are labelled with positron emitting radionuclides and then administered to the subjects. The temporal and spatial distribution of these radiotracers within the body is measured with PET.

PET, combined with tracer kinetic models, measures blood flow, membrane transport, metabolism and ligand receptor interactions noninvasively and quantitatively in humans. PET has been used extensively to study cellular metabolism in the brain, heart and malignant tumours.

# PET

***"I am just coming from the Turku PET Centre where a new kind of PET scanner, the PET/CT, is being installed. PET/CT is a hybrid device, which differs from the earlier imaging techniques in that it directly combines a PET scanner and computer tomography. Consequently, it is possible to see the structure and the function of the tissue simultaneously," says Heikki Minn enthusiastically. The technical development of PET equipment is progressing rapidly, and the hybrid device has made a breakthrough within the last couple of years.***

Adjunct professor Heikki Minn is a specialist in oncology who teaches and carries out clinical research at the University of Turku. Primarily, he works in the Turku University Central Hospital (TUCH), where he is the Chief Physician in the Radiotherapy unit of the Department of Oncology and Radiotherapy.

Minn was involved in the research and treatment of cancer in Turku already during his residence phase in the 1980's, at a time when not even a single PET camera had been installed in the PET Centre. He first became acquainted with the actual PET research in Turku, when the first PET device was installed in 1988, and then as a postdoctoral student in the United States, in the University of Michigan. At this point, at the beginning of the 1990's, the PET technique was still at the experimental stage, and it was not certain if it could be used in clinical applications.

In his research, Minn has specialised in cancers occurring in the head and neck area, in other words, cancers of the larynx, oral cavity and pharynx. "With the PET scan, the spread of the cancer can be located and its metabolism can be determined. The metabolism of the cancer affects the way the cancer is treated. Thus, information about the metabolism helps us to plan the proper treatment according to the patient's individual needs. Furthermore, metastases can also be detected, and the spread of the cancer is more than a mere guess. The PET technique also enables determination of whether the treatment has been effective or not."

Other research results have been obtained with the PET technique as well. For example, by analysing the tumour's glucose metabolism, physicians can evaluate how cancer cells grow, a factor which affects the treatment of cancer. Hypoxia, on the other hand, is one of the characteristics of malignant tumours. Some cancerous tumours survive with very little oxygen, and this kind of tumour usually spreads more aggressively compared to another tumour. With oxygenation closer to normal tissues. In addition, radiation therapy is less effective in the case of tumour hypoxia. By

# imaging technique

## brings accuracy to the research and treatment of cancer

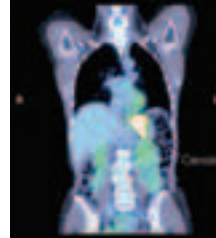
using a PET scanner, the tumour's oxygen content can be determined, and a higher dose of radiation can be targeted at hypoxic cancer cells.

### NEW AREAS OF RESEARCH AND TREATMENT

"At the moment, international research is being carried out in which hypoxic tumours are given extra oxygen. The Turku PET Centre was involved in research in which experiments in mice showed that hypoxia of breast cancer is reduced when the tumour is oxygenated," explains Minn.

The Turku PET Centre is also involved in cooperation with a company called Turku Imanet Oy. The PET technique is used in the development of new drugs and in the evaluation of their effectiveness. The Turku PET Centre and Turku Imanet Oy are cooperating in the development of new cancer drugs, the aim of which is to prevent angiogenesis (blood vessel generation).

The images obtained in the PET scan help not only to locate the cancer and determine its metabolism, but also to accurately measure the required treatment. "With these images, we can evaluate even more specifically whether the patient needs radiation therapy, chemotherapy or only



*Melanoma patient's PET scan with fluorine 18-labelled fluorodeoxyglucose (FDG). Lymph gland metastases were resected from the patient's neck area, and he was referred to radiation therapy when the regular X-ray scan (computerised tomography scan of the whole body) did not show any abnormalities. In addition to the neck area, the PET scan showed metastases between the lungs and in the lymph glands below the diaphragm. Hence, radiation therapy as a form of treatment was abandoned, since the patient would not have benefited from it. In addition to cancer metastases, the image shows strong physiologic uptake of tracer in the brain, heart muscle and bladder.*

observation. Now we are able to obtain more specific information about the tumour and its location, and there is no need to second-guess what would be the best treatment. In the future, with the help of PET, we can continue to develop new drugs in order to eliminate cancer."

**"At the moment, international research is being carried out in which hypoxic tumours are given extra oxygen. The Turku PET Centre was involved in research in which experiments in mice showed that hypoxia of breast cancer is reduced when the tumour is oxygenated," explains adjunct professor Heikki Minn.**

# IN SHORT

01

## THE ANDERS JAHRE AWARD FOR SIRPA JALKANEN

Academy Professor Sirpa Jalkanen has been awarded the Anders Jahre Award for Medical Research 2005. The award was granted as recognition of outstanding scientific achievement. The award includes a grant of one million Norwegian crowns. Academy Professor Sirpa Jalkanen and her group are based in the MediCity Research Laboratory at the University of Turku and the Turku Branch of the National Public Health Institute. Her research belongs to the field of immunology and deals with the mechanisms that regulate the migration of white blood cells, leukocytes, in the human body.

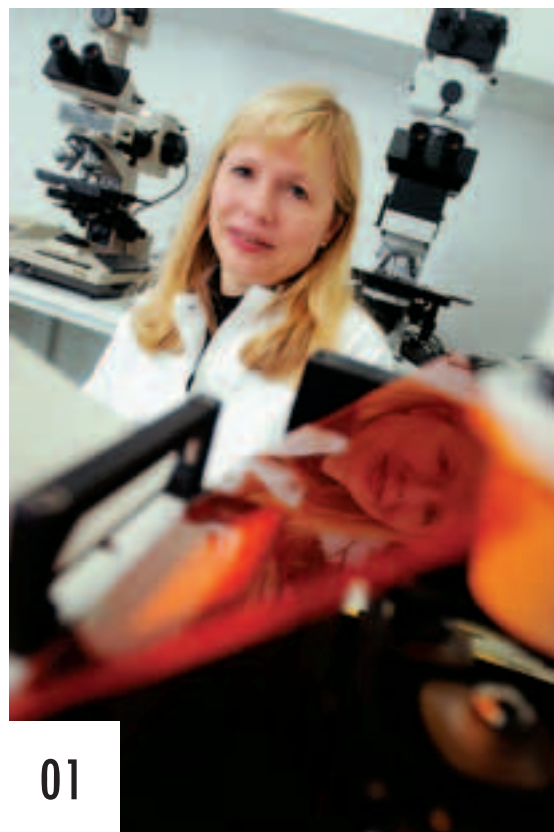
## THE BOLOGNA PROCESS IN ACTION

The introduction of the Bologna process was a painful experience for Finnish universities even though many of the formal goals of the declaration had already been fulfilled in the reforms of the 1980s and 1990s. However, during the past two and a half years there has been rapid progress, and the reform of the Finnish structure of higher education was put in place on the 1st of August 2005.

The renewal of the degree structure, including the adoption of the ECTS and the three cycles of bachelor, master and doctor, are the means to reinforce the position of our universities in the European and world arena. Finnish universities have launched and updated their strategies to adjust to the recent significant global changes and the fierce competition that has come to dominate many aspects of higher education.

Even after the reform, the dual model of higher education will stay with us, i.e. polytechnics are meant to offer shorter vocationally-oriented degrees, and universities academic and scientific education and training.

Although the labour market value of the bachelor's degree is increasing, the master's degree will remain the basic requirement for academic professionals. This applies, e.g. to teacher training, where Finland has been ranked high in the recent Pisa evaluations.



01

## INTERNATIONAL FUNDING FOR INTERNATIONALISATION PURPOSES

Throughout its history, the Baltic Sea Region Studies Programme (BSRS) has been active in developing international contacts and partnerships. The goal of the international projects is to strengthen academic collaboration and to develop new tools (like joint degrees) for the partner universities in enhancing the European Higher Education Area. At present, the BSRS Programme is a partner in two international projects.

The BalticStudyNet is a networking programme for the promotion of higher education in the Baltic Sea Region and beyond. It aims at mapping higher education institutions and existing study programmes, developing innovative curricula, and designing new tools for academic training according to existing needs. Its focus is on the study and research programmes dealing with political, economic and cultural aspects of the Baltic Sea Region.

The Nordplus Neighbour project "The International Classroom" is a project for deepening the cooperation of several Nordic and Baltic universities. The objective is to arrange workshops, to which educators from partner universities are invited, to improve their skills to work in an international and multicultural environment.

This project is a continuation of the project of seven universities around the Baltic Sea Area in 2000–2002, which was coordinated by the BSRS Programme, and also funded by the Nordic Council of Ministers.

See more <http://balticstudies.utu.fi/>

## THE UNIVERSITY TOOK PART IN THE EUA SURVEY

The European University Association (EUA) has published a survey about the Bologna process in European universities. The survey was carried out in the University of Turku on the initiative of the Coimbra Group. The survey was introduced in Bergen in May 2005, in the meeting of the European ministers responsible for higher education.

The survey, Trends IV, was established to answer the questions that emerged in the European universities because of the Bologna process. The idea was to identify different tasks and concerns at different levels in the universities: concerns of the students, PhD students, administrators, junior staff, academics and deans.

The result showed that there are many factors affecting the success of the reform processes. In the survey, it was noticed that the reforms need time, support and greater awareness in the society. It also showed that the institutions need more functional autonomy as a fundamental condition for successful reform. This implies the strengthening of governing structures, institutional leadership and internal management. Moreover, the question of funding the reform and the issues of investing in higher education need to be addressed.

More information

<http://www.eua.be/eua/index.jsp>



02

## NORDLINKS — ONE OF THE LARGEST NORDPLUS NETWORKS

NORDLINKS – the network for studies in Nordic literature, culture and language – is, with its 35 departments at 29 universities in 7 Nordic countries and self-governed territories, one of the largest networks within the Nordplus group. From January 2005, for three years onward, it will be administered from the Nordic department at the University of Turku.

Our activities, which are open to all students registered at one of our partner institutions, consist mainly of student exchanges, approximately 100 per year, and teacher exchanges. Additionally intensive courses are arranged on an annual basis; this summer in Aalborg, Denmark, on contemporary Nordic thrillers, next January in Stockholm, Sweden, on modern Nordic drama. The latest addition to our educational programme is a Joint Master's Degree in Nordic medieval culture, administered from Århus, Denmark, in cooperation with the universities in Reykjavik (Iceland), Bergen (Norway) and Uppsala (Sweden). We are proud to welcome the first students to this programme in August 2006.

02

## THE TEAM OF TRANSLATORS

Several of these articles were translated from Finnish into English by **Hanna-Liisa Makkonen** and **Annika Karvonen**, with a little bit of help from **David Bergen** and **Jacqueline Välimäki**, all from the Department of English Translation and Interpreting. Seen in the photo above, from top to bottom, Jacqueline Välimäki, Annika Karvonen, Hanna-Liisa Makkonen, in front of Signum, the new premises of the Centre for Translation and Interpreting. David Bergen is missing from the picture.

Photo Vesa-Matti Väärä

03



03

## THE PIONEER PROJECT ADDRESSES THE ONSET OF PUBERTY

Early exposures to various environmental factors during childhood are considered to be very significant. The developing body may be very susceptible to several external factors, and exposures at critical stages of development may result in long-term and permanent adverse effects.

The new research programme, PIONEER, is a specific targeted research project (STREP), and it is funded by the European Commission. The project clarifies, for example, the factors that have affected the early onset of puberty increasingly observed in Europe and other parts of the world. Exceptionally early onset of puberty is suspected to be related to environmental and nutritional factors.

The PIONEER consortium consists of 12 research groups and a large group of experts specialised in clinical and experimental sciences. There are 11 research groups from 6 European countries and one from Pakistan. The funding granted by the European Commission is three million euros for a period of three years. Three groups from Finland are involved in the project: the University of Turku, co-ordinator for PIONEER (**Sari Mäkelä**, M.D., docent **Matti Poutanen**, and Professor **Ilpo Huhtaniemi**), Kuopio University Hospital (Professor **Leo Dunkel**) and the University of Helsinki (Professor **Olli A. Jänne**).

The preparation and application process of PIONEER was supported by the CASCADE Network of Excellence, which is funded by the European Union. One focus of the ongoing 6th framework programme of the European Commission is the quality and safety of food.

PHOTO: Senior lecturer **Sari Mäkelä** and her research group are experts on e.g. nutrition. Photo Vesa-Matti Väärä

## THE UNIVERSITY IS COORDINATING A NETWORK IN PALLIATIVE MEDICINE

The University of Turku is coordinating a new Nordplus Neighbour network in palliative medicine. Nordplus Neighbour supports cooperation in education between the Nordic and Baltic countries, the Åland Islands, and Northwestern Russia. The programme is financed by the Nordic Council of Ministers.

The application was designed by Professor **Eeva Salminen**, and it is based on her network collaboration with top experts and specialists in palliative medicine in the participating countries.

The background to the network is the increasing incidence of cancer and lack of evidence-based appropriate palliative care and training in palliative medicine in many of the countries, especially in Finland. Some of the centres in Norway with a longer tradition and centres of excellence in the field provide models for development, and this enables the tuning of programmes in research and education.

The network aims to develop and adjust the teaching and management of palliative care in the participating countries, following the European Code Against Cancer and WHO recommendations. The focus is on improving the pattern of practice through education and collaborative research programmes.



Mirikka Ruotsalainen and Jonna Kuokkanen enjoying the early summer in the university campus area.



# INTERNATIONAL STUDENTS ARE IN GOOD HANDS

**“The University of Turku offers many support services for international students, for example tutoring service for arriving students, which is internationally quite rare,” explains J o n n a K u o k k a n e n. She is at the moment International Officer at the Faculty of Mathematics and Natural Sciences.**

“The tutors are university students and they offer help to incoming students. They meet the students when they arrive in Turku. The tutors help with registration and with accommodation arrangements. International students can always ask their tutors for help, as long as they remember that the tutors are students themselves, and they do the tutoring voluntarily.”

Services for international students also include an orientation week in September and another in January. During the week there are lots of different lectures about the University, the Student Union, about student life and about living in Turku and Finland. There are also various guided tours, and a welcoming party is arranged during the week.

Those international students who are members of the Student Union are entitled to health services, different student discounts, and legal help. For instance, the European Student Network and Student Union associations offer lots of free-time activities.

## **HIGH QUALITY OF THE RESEARCH AND THE INSTRUCTION**

**Mirkka Ruotsalainen** is Planning Officer of the Master’s Programme in Environmental Sciences in the Faculty of Mathematics and Natural Sciences.

“The most popular subjects among foreign students in our Faculty are geography, biology, biochemistry and information technology. Last

year we had about 70 degree students, and altogether we had 219 international students in our Faculty,” says Ruotsalainen.

At the moment, the Faculty of Mathematics and Natural Sciences has two different Master’s Programmes: the Master’s Programme in Environmental Sciences and the Master’s Programme in Information Technology. In 2006, a new programme will be started in the field of Bioinformatics.

“The IT Programme appeals especially to students from Asia. The students of Environmental Sciences and the exchange students are from all over the world: mainly from Spain, the Czech Republic, Poland, Great Britain, France and Germany. And of course there are also students from Finland in the programmes.”

The Faculty of Mathematics and Natural Sciences offers internationally high level teaching and research. Instruction is available in English in many subjects. Also the multidisciplinary character of the subjects increases the popularity of the Faculty among the foreign students.

“Both our Master’s programmes respond to the demand. Especially the Programme in Environmental Sciences is popular, because it is unique in Finland,” Ruotsalainen points out.

# Nuestra experiencia en Turku

Desde los preparativos del viaje en Perú, la llegada a Turku y todos estos días transcurridos en esta ciudad han sido una experiencia enriquecedora en todo sentido. Todas las personas han sido siempre amables, atentas a cualquier duda o necesidad que pudiéramos tener y principalmente están dispuestas a ayudar y solucionar cualquier dificultad que se presentara. Esta actitud fue fundamental para hacernos sentir con la confianza suficiente de iniciar este nuevo periodo de nuestra vida en un país tan diferente al nuestro. Acostumbrarse a los cambios culturales, climáticos y económicos, no ha sido fácil. Pero gracias a al apoyo de la calurosa gente Finesa nos hemos sentido como en casa.

La vida universitaria en Turku es muy diferente que en Lima. Este ciclo de intercambio es un reto constante. Principalmente, por ser la primera vez que hemos llevado los cursos en un idioma diferente a nuestra lengua natal. Pero después del duro trabajo académico podemos decir que hemos salido adelante. Los cursos han sido diversos y enriquecedores. Nos han ayudado a ver el mundo desde una nueva perspectiva y a entender un poco más la cultura de otros países.

Por otro lado, encontrarse todos los días con personas de diversos países es un continuo aprendizaje. Será muy difícil olvidar a todos los amigos que hemos encontrado en Turku tanto Fineses como extranjeros, no solo por la noches de fiestas, reuniones y divertidas conversaciones, sino porque han enriquecido nuestras vidas conociendo un poco más de sus costumbres y experiencias.

En todo sentido esta experiencia como estudiante de intercambio

en Turku ha significado un gran crecimiento personal. Las amistades, los compañeros de clase, los profesores, la vida en una cultura distinta, el estudio de otro idioma... Nos sentimos afortunadas de haber tenido esta oportunidad y seguido aprovechando al máximo todo el tiempo que nos queda en Turku. Finalmente, me queda decir que mi experiencia en la Universidad de Turku solo se resume como "extraordinaria".

*The writers Claudia Cáceres, Svetka Kuljich and Karen Eckhardt are all from Peru and studying in the North-South Higher Education Network Programme.*

*The new North-South Programme will support reciprocal teacher and student exchanges between two or more higher education institutions in Finland and sub-Saharan African countries, Egypt and Peru. The programme is administered in Finland by CIMO (Centre for International Mobility) and financed by the Finnish Ministry of Foreign Affairs.*

*The aim is to create permanent relations between the universities and promote economic and social development in developing countries. The network in Turku University is coordinated by the Faculty of Mathematics and Natural Sciences and the members in the network are, besides the University of Turku, the Peruvian universities, University of San Marcos and the University of La Molina.*



The preparations for our journey from Peru, our arrival in Turku and the days spent here have been rewarding experiences for us in many ways. People have been very friendly, helping us with all our questions and needs. This attitude has been crucial in giving us the confidence necessary to start this period in our life, in a country so different from ours: to get used to the different culture, climate and economy.

Academic life in Turku is very different from that in Lima. The exchange period has therefore been a challenge for us. First of all, this has been the first time we have been following courses in a language other than our mother tongue. But with hard work we have succeeded. The courses we have been following have been diverse and enriching; it has been a positive experience to see the world from a different perspective and to learn about the cultures of different countries. Daily contacts with people from different countries have proved to be a valuable us with a learning process. It will be very difficult to say goodbye to all our friends – both Finnish and international whom we have met here in Turku.

On the whole being an exchange student in Turku has been a period of great personal growth. Friendship, fellow students, teachers, life in a different culture, foreign language of tuition... we feel lucky that we have had the opportunity to take part in this extraordinary experience.

*Karen Eckhardt was "slow enough" to be photographed. The other writers, Claudia Cáceres and Svetka Kuljich, are missing from the picture.*

# The solar system as a laboratory

**Space physicists, if anyone, have a heliocentric view of the world, and these followers of Galileo Galilei do not have to worry about the inquisition. The first Finnish space exploration instrument, the energetic particle detector ERNE, developed by scientists in Turku, gives information in almost real time while orbiting the sun as a part of the SoHo satellite. The future is the AMS-detector, built in international cooperation, which gives enormous new possibilities for research.**



"From above the atmosphere we can explore space, but also the Earth. Observing the Earth in particular has become increasingly important. From a narrow point of view, space research includes exploration of the solar system. We are studying what the solar system is made of and what processes take place in it," explains space physics Professor **Jarmo Torsti**.

The research at the Turku University Space Research Laboratory is concentrated on solar and heliospheric physics related to high energy particles that burst into space as a result of solar flares.

## SOLAR WIND FILLS THE SOLAR SYSTEM

It has been possible to study space from space since the 1960s.

"Signals, messages moving in space, can be studied without interference, without the Earth's atmosphere or magnetic field affecting them. In space there are signals that are stopped by the atmosphere or the magnetic field.

"The solar system has even become a laboratory for human beings. We can go to a planet and study it at close range; we can even land on it. The composition of planets can be studied, and then compared to the Earth's composition.

"Satellite telescopes can also be turned towards outer space, which enables the study of the Universe and its processes. This takes us closer to the field of astronomy."

Space is not empty, as was earlier believed. The solar system, for example, is full of solar wind, which reaches even the far boundaries of the solar system.

"Solar wind refers to the outermost layer of the Sun, the Corona, which consists of hydrogen, helium and other common elements. It streams at speeds of about 400 km/s when it reaches the Earth. It is composed of ionized elements and electrons, which means it is in the plasma state. This plasma carries magnetic fields along with itself. Solar wind is a very thin cloud of gas that fills the solar system at all times."

## THE FINNISH INSTRUMENT IN SPACE

The ongoing SoHo (Solar and Heliospheric Observatory) project is aimed at obtaining basic research information on the Sun's yet unknown effects on the Earth. SoHo is a joint venture of ESA (the European Space Agency) and NASA (the National Aeronautics and Space Administration) which aimed at having the satellite collect information for six years. In December 2005 SoHo will have been orbiting the Sun for ten years, far exceeding the goals set for it.

*Professor Jarmo Torsti, the ERNE model, and the AMS detector on the poster in the background. ERNE, which is the acronym for the particle detector, also means an eagle in Old English. Only a very small part of the information collected by ERNE has been analyzed. There is enough data to analyze for decades.*



**“We analyse our own measurements. Our researchers process large amounts of information and model the results theoretically. ERNE has been the subject of seven doctoral theses and about 80 scientific publications.”**

The building of SoHo was begun in the 1980s. It took seven years to complete.

"The Wihuri Physical Laboratory at the University of Turku began studying cosmic radiation in the 1960s. In the late 1960s, I joined the cosmic radiation group. We studied high energy particles originating from the Milky Way, the remains of which reach the surface of the Earth, and thus can also be studied on the Earth's surface. In 1986 I heard that Finland had become an associate member of the European Space Agency, which enabled us to take an active part in ESA programmes. A solar research programme was being launched, and a high energy particle detector would be a part of it. We decided to take part in the competition.

"Our energetic particle instrument ERNE (Energetic and Relativistic Nuclei and Electron) is the first Finnish instrument to be accepted in an ESA programme. It was designed and built in its entirety in Finland in the years from 1987 to 1994. Some of it was built at the VTT Technical Research Centre of Finland and some by Finnish industry. An automatic instrument which includes a computer requires a great deal of know-how. We were responsible for the general design, the testing system and the ground support of the instrument."

## HUGE AMOUNTS OF NEW KNOWLEDGE

The launch of the probe was not without drama.

"The probe was moved to Florida to the Kennedy Space Center. The first launch was interrupted because of technical problems that were noticed in the satellite, but the second launch on the second of December in 1995 was successful. Then, all of a sudden, in the summer of 1998 all communication with the probe was lost, but after 40 days, contact was regained, and the satellite was again turned towards the Sun. All equipment was functioning, even though the probe had been in temperatures of a hundred degrees below zero."

ERNE reports what types of particles hit it, and when and which direction they come from. ERNE can analyze about a thousand particles per second. The detector is equipped with the most efficient radiation-resistant processor of its time. Its software can be updated from Earth. The analysis takes place automatically, and it reaches the Earth via telemetry with a few hours' delay. SoHo has collected information for 24 hours a day for

ten years, so the amount of data is enormous.

"We analyse our own measurements. Our researchers process large amounts of information and model the results theoretically. ERNE has been the subject of seven doctoral theses and about 80 scientific publications."

"With ERNE we study the explosions on the surface of the Sun in particular, which often are connected with sunspots, i.e. strong concentrations of the magnetic field. When the sunspots move in relation to each other, the magnetic fields collide, and explosions occur at the points of collision. There are also Coronal Mass Ejections (CMEs) almost daily. The CMEs send matter into space at speeds that can reach a thousand kilometres per second, and the mass cloud produced by the ejection might be sent towards the Earth. The amount of matter in a mass cloud could cover the area of Finland to a depth of one metre. These ejections in the magnetic field release the same amount of energy as is used on Earth in a hundred years. The SoHo satellite studies exactly these ejections. It orbits the Sun at the same pace as the Earth.

"We are, however, 150 million kilometres from the Sun, so the effects of the releases of energy are usually quite mild for us. The ejections reach the Earth in a couple of days and cause magnetic storms. The CMEs are connected with magnetic fields, and they emit high energy particles which may come close to the Earth's surface at the magnetic poles. This sometimes allows us to see the Aurora Borealis in the winter sky. The magnetic ejections are a problem, as they can cause disruptions in electricity distribution systems and wireless communications."

Nowadays, hundreds of satellites orbit the Earth. They can also react to electrical impulses or CMEs, and thus malfunction.

The SoHo project has brought us enormous amounts of new information about the Sun. Professor Torsti gives us an example.

"The surface temperature of the Sun is about 5000–6000 degrees. When we move further away from the surface, the temperature rises to a million degrees, when the radiation becomes X-radiation. The great mystery has been why the Sun's atmospheric temperature rises, when the effect is the opposite on Earth – the temperature at normal flying altitudes is 50 degrees below zero. Now, with the help of SoHo, we know that the Sun's magnetic field is a complicated patchwork. When the magnetic fields move in relation to each other, electric discharges take place; these are short circuit processes that warm up the Sun's atmosphere."

**"Anti-nuclei have not yet been found in nature. If we could find one, it would be the scientific discovery of the century."**

## COSMIC LOTTERY

The next project is the Alpha Magnetic Spectrometer (AMS). This project is led by a Nobel Prize winner and particle physicist, Professor Samuel Ting, who works at the famous MIT (Massachusetts Institute of Technology). The AMS will be taken to the International Space Station in 2008. As a result of ERNE, Ting visited Finland to present his project and he wanted us to join him. We have a small but quite significant part to play.

"The project aims at solving central questions about the Universe, such as can anti-matter, in which helium would have a negative atom nucleus orbited by positive positrons instead of negative electrons, be found in the Universe. Anti-matter particles might come from the other edge of the Universe as cosmic radiation."

The venture might bring information about the birth of the Universe. "The Universe has ten times as much so-called dark matter as it does visible matter. The second aim is to study the possibilities of the existence of dark matter."

AMS is like a space physicist's lottery machine, where anti-matter particles are sought like lottery balls. If anti-matter could be caught, the basic theories of cosmic physics would be taken to a whole new level.

"Anti-nuclei have not yet been found in nature. If we could find one, it would be the scientific discovery of the century. Ting would get another Nobel Prize for it. I don't believe it is possible, but one must keep on hoping. Ting has said that when a scientist looks for something, he finds something completely different, but it may be just as revolutionary. That is where the excitement lies," says Torsti, laughing.



## PISA 2003:

# FINNISH STUDENTS ACHIEVEMENTS WERE AGAIN TOP LEVEL

THE RESULTS OF THE SECOND ROUND OF THE EXTENSIVE INTERNATIONAL STUDENT ASSESSMENT PROJECT OF THE OECD (PISA) WERE PUBLISHED RECENTLY. MORE THAN 250 000 STUDENTS FROM 41 COUNTRIES TOOK PART IN IT.

The PISA study is designed to provide international indicators of the skills and knowledge of 15-year-old students. In Finland, they are in the final grade of the comprehensive school. The data of the first round were collected in 2000. It emphasized reading literacy as the target of the main measurements. Finnish students were highly successful in reading achievements already in 2000, but now they came first also in scientific literature, and second in mathematical literacy and in problem solving. The information bulletin of the OECD describing the new results for the first time was titled as follows: "Top-performer Finland Improves Further in PISA Survey as Gap Between Countries Widens".

## PESSIMISM IS REALISM

This time, Finnish students' performances in mathematics and science match those of top-ranking Asian school systems in Hong Kong-China, Japan and South Korea. It is typical of Finns to become worried when we do well or everything looks good, because we tend to think that there is only one direction left, namely, downwards. However, when taking into account the economic crisis in many municipalities, with the result being continuous growth in class sizes, diminishing resources for helping slower learners etc., this pessimistic view may be seen as very realistic. Although rank orders of national results give those responsible for educational policies valuable feedback from a comparative perspective, and arouse even heated national debate, it is important to go beyond this and analyze the national results especially in the light of equality objectives.

PISA integrates the assessment of subject-specific knowledge with cross-curricular competencies. The 2003 survey introduced the first assessment of wider student competencies – that of problem-solving abilities. PISA seeks to assess how well 15-years-olds are prepared for life's challenges, i.e. the relevance of skills and knowledge learned at school for life-long learning. It is also worth noting that many of the tasks given to students were open, requiring written responses.

The main attention was paid this time to the level of mathematical mastery. For the careful designing of tasks concerning mathematical literacy it was divided into four content areas: quantity, space and shape, change and relationships, and uncertainty. Relatively speaking, Finnish students were not quite as successful in the areas of space and shape, and change and relationships as in the other two areas. These areas reflect skills in geometry and algebra. This may be partly due to the reduction in teaching hours for these contents in the comprehensive school during the last decade. In designing tasks, not only readiness for later studies in math, but also skills in solving authentic types of tasks typical of everyday life in the information society were taken into consideration. In addition to achievements, measures of students' engagement in and motivation toward mathematics were also included.



## GOOD QUALITY AND RELATIVELY GOOD EQUALITY

In Finland, boys were, on average, slightly better than girls in mathematics, whereas girls were clearly better than boys in reading. Girls were also better than boys in science literacy and in problem solving.

In PISA 2000, the differences between Finnish girls and boys in reading were among the largest of the OECD countries. The difference is still large although it had become slightly narrower by 2003. The results indicated again that differences in attitudinal and affective factors are great between boys and girls. For instance, boys rely more on their mastery of math, whereas girls feel more anxiety in mathematical problem solving.

The national comparison of results indicates that, in Finland, a high level of achievements was linked to a relatively small variation between students (and also between schools). Thus, it seems that we have managed to combine a good quality of education with relatively good equality. There are countries where the proportion of high achievers is as high or even higher than in Finland, but the share of poor performers is much greater in those countries. Our comprehensive school, which has emphasized equal opportunities and support for students in need of extra help, seems to have done a really great job.

The trends in the results indicate that in countries (like Germany) with highly stratified and early selective systems, there are larger differences in achievements between schools, while the socioeconomic background of students is a much stronger predictor of their achievement level. However, some other analyses based on national data representing different school subjects indicate rather large differences between the highest and lowest quartiles of students also here in Finland. The abandoning of school districts, parents' freer selection of school for their child, the tendency today to emphasize only top performances, and elitist thinking, all seem to lead to increased differences in achievements at the level of both students and schools.

## ELEMENTARY TEACHER TRAINING AT UNIVERSITIES

As a representative of the faculty responsible for teacher training, it is pleasing to interpret the PISA results as evidence of the good pedagogical skills of our teachers and the functionality of our teacher training system. Naturally, the fact that we have more highly qualified and motivated applicants for teacher training than in any other European country plays a crucial role in this context.

The unprecedented teacher training reform during the seventies, consisting of transferring elementary teacher education to universities and raising it to master's level, has created a firm foundation for students' good achievements three decades later. On a broader cultural and societal level, there are also some factors producing beneficial preconditions for well-functioning education, for example, a strong appreciation of knowledge (which comes out already in our national epos, Kalevala) and the Lutheran ethos emphasizing hard work and fulfilling one's duties even when the work is not enjoyable as such.

There are many who wonder at the seemingly strange contradiction in the Finnish results: we are internationally at the top in cognitive achievements, but satisfaction toward school life and work is remarkably low among our students. Many Finns perhaps still think as they did about medicine in the old days. If it doesn't taste sour enough, it can't be effective. There has been analogous thinking in our educational tradition; if school work seems to be too pleasant and enjoyable, it may be more like a game, not effective studying or seriously taken school work. Have they been right?

*The writer is Professor of Education and Dean of the Faculty of Education at the University of Turku. He was also a member of the national steering group of the Institute for Educational Research (University of Jyväskylä) for the PISA project.*

## LEARNING, LEARNING ENVIRONMENTS AND EDUCATIONAL SYSTEMS

*A master's degree (120 ect)*

The Faculty of Education of the University of Turku will offer a Joint Degree in the field of education organised in the form of international co-operation. The English-language two-year Master's Programme will begin in the autumn term, 2005. The students can choose their specialisation from the following alternatives: 1) learning theories, 2) learning environments, and 3) educational systems. In addition to the studies at the University of Turku, part of the studies can be carried out in the partner universities.

The aim of the programme is to develop the qualifications needed as a researcher or specialist in national and international projects. Already in the first year, applications have been sent from all parts of the world: from Asia, Africa and European countries. The first students will start their studies in the programme in September, 2005.

Requirements for admission are a completed lower university degree at Bachelor's level and a good command of English. It is not possible to acquire formal teacher competence along with the master's degree. Rather, the degree can serve as a channel for the continuing studies of teachers.

More information at: <http://www.edu.utu.fi/english/index.htm>



# The Finnish language is different but not difficult



“The Finnish language is taught in 102 foreign universities in about 30 countries. Finnish is taught in almost every European state, in Asia and in North America. Also in Australia, South America and in the Canary Islands there has been instruction in the Finnish language, even though it has not been on a permanent basis. There are about 4 000 students studying Finnish in foreign universities.”

Senior Lecturer, **Kirsti Siitonen** PhD, teaches Finnish language and culture to native and foreign speakers in the University of Turku. She says that the interest shown towards the Finnish language and culture has grown, especially since Finland joined the European Union in 1995.

“The University of Turku offers a new Master’s Programme in Finnish and other Finno-Ugric Languages starting from autumn 2005. There is a distinct need for the programme because nowadays there are quite many students who want to study the Master’s Programme in Finland. These students have been awarded a Bachelor’s degree in Finnish or in other Finno-Ugric languages in their home university before applying to Turku.” Professor of Finno-Ugric languages, **Sirkka Saarinen**, adds that the language skills in Finnish have to be quite good, because the language of instruction in the programme is Finnish.

## SURVIVAL COURSES AND MORE ADVANCED COURSES

A foreign student can also study Finnish in a programme called Finnish Language and Culture for Foreigners. That is a non-degree programme. The instruction in this programme is also in Finnish, and to be able to follow it, at least two years of Finnish studies are recommended.

Many of the exchange students who study something else in the University choose a Finnish course from the University’s Language Centre. The Language Centre offers “survival courses” and more advanced courses for foreigners.

“Finnish grammar is very systematic and logical. The difficulty, for example, for students who come from the Indo-European language area is that the Finnish vocabulary does not have similarities with the Indo-European languages. Therefore, you have to learn a whole new vocabulary,” Kirsti Siitonen explains.

Finnish is part of the Uralic family of languages. It is one of the Finno-Ugric languages like Estonian, Hungarian and Saami, which is spoken in the northern parts of the Scandinavian countries. Globally, there are about 6 million Finnish speakers. Finnish is spoken mostly in Finland, Sweden, Norway, Estonia, the United States and Russia.

## FROM FINNISH CULTURE TO THE FINNISH LANGUAGE

People who are interested in foreign languages choose Finnish for many reasons. The most common reasons are a pure interest in linguistics and professional reasons. Finnish is quite a special language to know and that might be useful on the labour market. There are also usually a few students who choose Finnish because of interest in their family’s Finnish roots or because they have fallen in love with a Finn.

“My students have, for example, translated Finnish literature into Japanese and German. One worked as a lawyer in Hamburg and helped Finnish firms with their legal issues. My former students

have also been working in Finland’s embassies and in Finnish institutes abroad,” says Siitonen.

Foreign students tell many different stories about how they have found the Finnish language and culture in the first place. One thing is that Finnish music is quite well-known. Classical composers like Jean Sibelius, and nowadays also rock bands like HIM, Nightwish and The Rasmus make Finns known all over the world. For some, Finnish writers like **Tove Jansson** with her Moomin stories and **Mauri Kunnas** have woken an interest in the Finnish language and culture.

One enthusiast was **J.R.R. Tolkien** (1892–1973). It is said that he got his inspiration for the Lord of the Rings saga from the Finnish national epic Kalevala. Tolkien studied Finnish so that he could read the Kalevala in its original language. The idea about a hero’s journey and the characters do have some resemblances. Even the language of the elves in the books has been influenced by the Finnish language.

# Electronics productisation training near companies

The new electronics productisation training of the University of Turku in Salo offers something completely new in Finland. Salo is an electronics town with Nokia factories. To be accepted to the training, students need to have a Bachelor of Science or equivalent degree, and after the training, they will graduate as Masters of Science in Technology. During the training, the students gain practical experience in productisation by cooperating with companies in the industry. This is to guarantee that students will find work after graduating.

The international Department of Information Technology (IT) of the University of Turku, with a strong research and high-standard teaching profile, is partly situated in the neighbouring town of Salo, more specifically within the Salo unit of Turku Polytechnic and near the town's electronics industry. In addition to the Bachelor of Science programme in software engineering that started in 2001, in autumn 2005 Salo will initiate electronics productisation training, which is unique in Finland.

It is not difficult to guess why so much has been invested in Salo. The town near Turku is the most important of Finland's silicon valleys, where there is sound expertise in the field of electronics. Moreover, the main factories of Nokia, the flagship of Finnish electronics, are situated in Salo.

Virtual teaching is also being planned between the two towns. The implementation of the project has the support of the Educational

Technology Unit of the University and the various electronics companies in Turku.

## THE IT DEPARTMENT IS DEVELOPING RAPIDLY

According to the Head of the Department, Professor of Microelectronics, **Ari Paasio**, the strength of the IT Department is that everything is included in the same organisation, the whole IT spectrum from data system sciences to more advanced technologies. "The University of Turku as a multidisciplinary university provides an opportunity for networking and cooperation between sciences."

"The Department of Information Technology is developing rapidly. In summer 2006, the ICT Turku Centre will be completed, and our department will move there together with those involved in ICT in Åbo Akademi University and Turku Polytechnic. One of the newest professorships is the chair of nanoelectronics, which was donated by the city of Turku in spring 2005."

The IT Department of the University of Turku has a Master's programme in information technology and a Master of Science programme in computer science, electronics and communications engineering. In addition to this, Salo offers a Bachelor of Science programme in software engineering, after which it is possible to continue to a Master's programme in Turku. Turku also arranges an international Master's programme in which one can study information technology, electronics and communications engineering. In autumn 2005, the University of Turku will also initiate a Master's programme in bioinformatics.



*Professor Ari Paasio teaching the course on basics electronics in Turku. In 2006, the whole IT Department will move to the ICT Turku Centre, which will be situated in the heart of the Turku Science Park.*

The IT Department of the University of Turku has a Master's programme in information technology and a Master of Science programme in computer science, electronics and communications engineering.

The University of Turku, Åbo Akademi University and the Turku School of Economics and Business Administration form a joint, innovative research and education centre of computer science (TUCS), which is closely related to the operations of the IT Department.

### CALL FOR NEW PRODUCTS AND EXPERTS

**Aulis Tuominen**, Professor of electronics productisation, started his work in Salo in autumn 2004. Tuominen transferred to Salo from the Pori University Consortium, where he worked as Professor of product engineering for the Tampere University of Technology. Before that, he had a long record of international service with Nokia, for example in Japan and in Korea, where he helped to start a new Nokia production plant.

"In this new programme, we implement the university's third function, that is, the idea that the research and education carried out in the university should benefit the people in the area," states Tuominen.

"Electronics productisation was chosen as a new training programme because Finland needs new products and experts who master the technologies behind them. Those future products may be connected with, for instance, personal information technology. A new, portable, automatic information processor can be something other than a cell phone. The aim is that in the future we would have another Nokia in Finland."

"The plan is that we go to a company with students who are in the last year of their studies, and by working together we come up with a productised product in which quality, price, user interface and processibility are compatible."

### COOPERATION BETWEEN COMPANIES AND STUDENTS

"We already have companies that would be willing to act as a kind of 'godfather' for us. The company will provide the materials and the technical expertise, and we will provide the productisation. The target product could be one which has reached the midpoint of its life cycle. Both the company and the students will learn from the product development process."

"In our training, the students will learn about business skills, cost management, so-called step-thinking, in other words, what kinds of steps productisation involves, how to manage the project, and how to get the products through the manufacturing process rapidly but without compromising quality," explains Professor Tuominen.



*Professor Aulis Tuominen together with Andersson Mwegerano, M.Sc. Tech from Tanzania, who works at Nokia and is Tuominen's first postgraduate in Salo.*

"Future products may be connected with, for instance, personal information technology. A new, portable, automatic information processor can be something other than a cell phone. The aim is that in the future we would have another Nokia in Finland."

**Aulis Tuominen**

The town of Salo and the companies there have welcomed the new training programme with open arms. The first research project is about to begin. Almost every electronics company in Salo is involved in the project. The project is related to the prohibition on the use of environmentally toxic lead which will come into effect at the beginning of July 2006. The lead soldering technique has been known since the days of Ancient Rome. The components used in modern cellular phones and televisions, for example, are attached with tin-lead alloy. When the use of lead is prohibited in all electronics products, there will be a need for a new, reliable material.

Professor Tuominen is also initiating research on productisation and printable electronics. In the latter, the objective is a radio frequency identification tag which can be attached to the product. The tag can be attached to increasingly smaller products in the logistics chain, and it can be read reliably from a distance.

# Science benefits enterprise

## About TUCS

The Turku Centre for Computer Science (TUCS) is a joint research and education centre between the University of Turku, the Åbo Akademi University and the Turku School of Economics and Business Administration. It is a multidisciplinary centre that provides instruction in three languages. It was the first Graduate School and one of the first Centres of Excellence in Finland.

TUCS coordinates research and education in the field of information technology. These activities are carried out in the TUCS Master's and Graduate Schools and in the centre's own research laboratories.

TUCS is in fact like a small university. At the departments participating in TUCS there are presently about 35 professors, 50 Ph.D. level researchers, 100 doctoral students and 2000 Master's students.

TUCS offers basic courses in Finnish and Swedish, while advanced level courses are available in English. In TUCS there are at the moment 36 foreign Ph.D. students and two foreign post doc –researchers. In the Department of Information Technology there are 15 students in the international Master's Programme.

Read more: <http://www.tucs.fi/education/master/>

## Research at TUCS

The research at TUCS is organized into research laboratories and centres. There are currently 17 research laboratories and two centres within TUCS. The research areas at TUCS are:

- Algorithmics
- Bioinformatics
- Communication Systems
- Discrete Mathematics
- Embedded Systems
- Information Systems
- Mathematical Modelling
- Microelectronics
- Software Engineering

### and the TUCS laboratories are:

- Algorithmics Laboratory
- Bioinformatics Laboratory
- Biomathematics Laboratory
- Communication Systems Laboratory
- Computational Biomodelling Laboratory
- Data Mining and Knowledge Management Laboratory
- Discrete Mathematics for Information Technology Laboratory
- Distributed Systems Design Laboratory
- Embedded Systems Laboratory
- Health and Medical Informatics Institute
- High Performance Computing and Communication Laboratory
- Laboris Information Systems Laboratory
- Learning and Reasoning Laboratory
- Microelectronics Laboratory
- Mobile Commerce Laboratory
- Network Economics Institute
- Software Construction Laboratory

Information and communication technologies are deeply implicated in how scientists do their work. When compared to twenty or even ten years ago, 'doing' science is a different game. Not only are scientists, engineers and the wider community better connected, but they are also becoming more highly collaborative.

An important outcome of the IT-enhanced environment is the shift from 'expeditionary' science to 'event/response' science, thanks to strategically placed sensors, monitors and tracking devices, for example, in marine biology and oceanography. These integrated advancements help to better inform entrepreneurs and policy-makers about new industry opportunities, as well as the risks and potential impacts on terrestrial ecosystems and marine environments.

Dr **Roberta Lamb**, of the University of Hawaii, has studied oceanographers, marine biologists and astronomers during her four-year grant period from the National Science Foundation in the United States. Her study of scientific collaborations in academia and industry has found that such changes in the way science is conducted, can also pave the way for new, interesting ways of organizing highly-innovative, for-profit research and development as industry R&D hybrids.

In Hawaii, as well as in Finland, many issues arise along the way from scientific findings to commercial products and services. Hybrid organizations have been promising, but they challenge traditional domains of academia and industry in ways that give rise to heated controversy. With industry R&D hybrids, a new approach to hybrid organizing, these issues may be resolved with clarity and fairness, as well as providing a greater opportunity for continued collaboration.

Dr Roberta Lamb is a Nokia Fulbright Professor at the Department of Information Technology for the autumn term 2005, working together with professor Eija Karsten in exploring the possibilities of these new kinds of hybrid in the Turku region. Subsequently, they will extend their study to other countries around the Baltic Sea. While in Turku, Dr Lamb will offer course discussions about her work under the auspices of the TUCS Graduate School and the nationwide INFWEST/IT doctorate programme. She will also give a public lecture.

### Further information:

Professor Eija Karsten, Department of Information Technology  
Email: [eija.karsten@it.utu.fi](mailto:eija.karsten@it.utu.fi), telephone +358 2 333 8662

*Dr Roberta Lamb (left) and professor Eija Karsten on Waikiki Beach in Hawaii.*





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