ProAcademia

NEWS FROM THE ACADEMY OF FINLAND
OCTOBER 2008

WELL-RESEARCHED FACTS ON THE METABOLISM OF TRANSGENIC PLANTS

YOUNG FINNISH RESEARCHERS SUCCESSFUL IN RACE FOR ERC FUNDING

Leader

Riitta Mustonen, Vice President (Research), Academy of Finland

Two processes are underway that will have important implications for research funding agencies and the whole Finnish scientific community, namely, the renewal of the University Act and the framing of a national innovation strategy. Consultations are ongoing on a new draft University Act, while the consultation process on the national innovation strategy was carried out earlier in the summer.

According to the draft law, Finnish universities in 2010 will become either bodies governed by public law or foundation universities. Following this change, Academy funding to universities will be redefined as a discretionary government transfer. Accordingly, the Academy will be required to review and revise its funding application and decision-making processes in compliance with the Act on Discretionary Government Transfers. The Academy is working to this end in close consultation with the Ministry of Education and universities. The aim is to make the funding process as simple and streamlined as possible.

The proposed national innovation strategy is primarily designed on the needs of administrations under the Ministry of Employment and the Economy, specifically the challenges of global competition faced by business and industry. Its aim is to change the way in which decisions are made on science, technology and innovation policy and to shift the focus to promoting innovations. Ultimately, the purpose of the strategy is to influence and steer public funding towards selected priority branches and industries.

However, from a science policy point of view, these are quite narrowly-focused objectives. The risk is that science policy is subordinated to short-term innovation policy objectives. The Academy's position is that in order to sustain competitive multidisciplinary research at the highest level and to ensure its renewal, we need to take a long-term approach that shall be outlined through science policy objectives.

The proposed innovation strategy does, however, include elements that the Academy considers important, such as increasing the resources invested in education and research. A strong and diverse knowledge base creates the necessary conditions for maintaining the welfare society and for our nation to succeed in an increasingly internationalised environment.

For many years now, the Academy has advocated and promoted many of the objectives set out in the proposal. These include the development of research infrastructures and research environments, the internationalisation of the research system, and the creation of a European Research Area. From the Academy's perspective, these are key objectives also in future.

ProAcademia

Publisher
Academy of Finland
Vilhonvuorenkatu 6
POB 99
FI-00501 Helsinki
Finland

Editor-in-Chief
Riitta Tirronen
tel. +358 9 7748 8369
riitta.tirronen@aka.fi

Editorial staff
Anita Westerback
tel. +358 9 7748 8306
anita.westerback@aka.fi

Layout
Piccolo Oy, Raija Sandqvist

Editorial board
Sanna Carlsson, Tiina Forsman,
Heikki Holopainen,
Leila Häkkinen,
Suvipäivikki Mikola,
Anu Nuutinen, Helena Vänskä

Translation
David Kivinen,
Academy of Finland

Printed by
Uusimaa Oy

Cover photo
Nina Dodd

ProAcademia magazine is published by the Academy of Finland. It gives an outlook to research funded by the Academy of Finland and the Academy's international cooperation. The magazine mainly focuses on the areas concerning the Academy's key activities that are research funding, expertise in science policy and strengthening the position of science and research.

ProAcademia magazine is published twice a year. The subscription of the magazine is free of charge.

The next issue will come out in spring 2009.

Sixth annual
ISSN 1459-6326

To subscribe to the magazine, please contact:
viestinta@aka.fi

In this issue

Academy of Finland 60 years

2008 marks the 60th anniversary of the Academy of Finland: 60 years as the prime public research funding agency in Finland. The history of the 60-year old Academy goes back to the year 1939, when the Act on the Academy of Finland was issued. However, due to the Second World War, the act did not come into force. A new Act on the Academy of Finland and state grants for the promotion of the cultivation of the mind at the highest level was issued in 1947. The old-form Academy of Finland that started its operation in 1948 was assigned the task of promoting the advancement of science and the arts. This task was to be undertaken by 12 Academicians: eight scientists and scholars as well as four artists. The new Act also defined the grant system, according to which it was the universities' task to award grants to researchers.

The old-form Academy of Finland was dismantled in 1969, and the Act on the arrangements of scientific research came into force. The name of the Academy was given to the new organisation that was based around research councils. The mission of the new Academy of Finland that was launched in 1970 was, besides to provide funding to high-level research, also to direct national research funding and to draw up science policy lines. At the time, the Academy consisted of the Central Board of Research Councils, six Research Councils as well as an administrative and financial office. The title of Academician became an honorary title and instead the Academy established fixed-term Research Professorships, which have since then been changed to Academy Professorships.

In 1994, the Act and Decree on the Academy of Finland was amended, to replace the Central Board of Research Councils with the new Academy of Finland Board, headed by a Director General appointed by the President of the Republic of Finland. Since 1994, the Academy has four Research Councils that decide on the allocation of research funding within their scope of expertise. Today, the Academy consists of the Research Councils together with the Board and an Administration Office. ■

FiDiPro programme brings twelve new top researchers to Finland

The Academy of Finland Board has decided to fund twelve new FiDiPro Professors to be recruited by Finnish universities and research institutes. Within the FiDiPro call, now arranged for the second time, funding worth nine million euros was granted for the work of foreign top-tier researchers in Finland for a period of five years on average. In this round, FiDiPro funding went to the University of Helsinki, the University of Oulu, the Finnish Institute of Marine Research, the University of Tampere, Tampere University of Technology, Helsinki University of Technology, the University of Turku as well as the Universities of Joensuu and Kuopio for their joint research project.

The professorships to be funded cover a wide range of scientific disciplines including mathematics, linguistics, physics, biochemistry, forest sciences and marine research. Also computer science and history are represented among the funded projects.

STRONG INTEREST CONTINUES

Launched in 2006, the funding programme attracted great interest also in the second application round. A total of 53 letters of interest were submitted within the FiDiPro call; of these the Academy Board decided to request full applications from 28 projects, among these also joint projects of two universities.

The Finland Distinguished Professor Programme (FiDiPro) is a joint funding programme of the Academy of Finland and Tekes, the Finnish Funding Agency for Technology and Innovation. Within the framework of the programme foreign or expatriate Finnish top researchers can work in Finland for a fixed period. The FiDiPro programme is aimed at achieving long-term international collaboration to strengthen Finnish scientific and technological knowledge and know-how. The universities and research institutes that were granted FiDiPro funding can recruit internationally esteemed experts who otherwise would be difficult to recruit to Finland for a longer period.

In all 28 FiDiPro Professors are presently working in Finland. The new FiDiPro Professors who now received a positive funding decision are expected to start their work in Finland at the beginning of 2009 at the earliest. ■
www.fidipro.fi.

2008 Millennium Technology Prize Awarded to Professor Robert Langer

The 2008 Millennium Technology Prize was presented to Professor Robert Langer for developing innovative biomaterials for controlled drug release. The world's largest technology prize is awarded by Technology Academy Finland for a technological innovation that significantly improves the quality of human life and promotes sustainable development.

Professor Langer's innovations have had a significant impact on fighting cancer, heart disease and numerous other diseases. His work has also brought about significant advances in tissue engineering, including synthetic replacement for biological tissues such as artificial skin. More than 100 million people a year are already using advanced drug delivery systems and this number is rising rapidly. In future, tissue engineering may revolutionise medical treatment that could affect millions of other individuals. "Tissue engineering holds the promise of creating virtually any new tissue or organ," said Langer.

Known as the father of controlled drug delivery and tissue engineering, Langer has been cited as "one of history's most prolific inventors in medicine". Professor Langer's research laboratory at MIT is the largest biomedical engineering laboratory in the world.

The other 2008 Laureates were each awarded prizes of 115,000 euros at the Award Ceremony. The DNA fingerprinting technique developed by Professor **Sir Alec Jeffreys** has revolutionised the field of forensic science and methods of defining family relationships. Dr **Andrew Viterbi's** innovation is the Viterbi algorithm, used to avoid errors in wireless communications systems and devices such as mobile phones. The fourth innovation awarded, the erbium-doped fibre amplifier (EDFA) invented by Professor **Emmanuel Desurvire**, Dr **Randy Giles** and Professor **David Payne**, has vastly increased the transmission capacity of the global optical fibre networks that carry telephone and internet communications signals.

"It's sufficient to say that each and every one of today's Laureates has excelled in fulfilling the most important of our requirements: benefit to mankind," said **Stig Gustavson**, Chairman of Technology Academy Finland. ■
www.millenniumprize.fi

Fill ‘er up – with biobutanol

Excess products from the wood processing industry – wood chips, biomass and fibre sludge – can be used to manufacture new liquid fuels. A particularly interesting candidate is biomass-derived butanol, since it seems to be the most suitable for replacing petrol as fuel in petrol engines. The production of butanol is researched in a project within the Academy of Finland’s research programme Sustainable Energy (SusEn).


Futureimagebank

The research project makes use of biomass to produce heavier alcohols and other oxygenous compounds. In this microbiological production, biomass is processed by means of microbes that effectively convert carbon compounds into butanol. “As butanol contains more carbon than ethanol does, it’s also more energy-efficient. Let’s put it this way: as fuel, 0.7 litres of butanol corresponds to one litre of ethanol. The energy density of butanol is almost equal to petrol,” says Professor **Ulla Lassi** from the University of Oulu.

Chemical synthesis is another production method the project is researching. In it, glycerol, methanol or ethanol is processed by means of catalysts into alcohols that can directly be used as fuel, such as butanol, pentanol and various mixed alcohols. According to Lassi, it would be very cost-effective to use glycerol, for instance, in fuel production, as it is one of the by-products of biodiesel production.

Lassi says that, with what is known today, butanol could well be produced even on an industrial scale, since it requires only two primary reactions. This means that it is at least as cheap to produce as ethanol, for instance. “Butanol is particularly suitable for use as fuel for motor vehicles also because it can be distributed via existing fuel distribution networks and used in car engines. Biobutanol also causes less corrosion than ethanol and isn’t as water-soluble as ethanol or methanol.”

Besides Lassi, the research consortium ‘New, Innovative Sustainable Transportation Fuels for Mobile Applications: From Biocomponents to Flexible Liquid Fuels’ includes **Riitta Keiski** and **Krsztián Kordás** from the University of Oulu and **Jyri-Pekka Mikkola** from Åbo Akademi University. **Lars Pettersson** from Stockholm University participates as an international partner. ■
www.aka.fi/energy

Diazepam has effect on nerve cells in the brain reward system

Addictions to medicines and drugs are thought to develop over a relatively long period of time. The process involves both structural and functional changes in brain nerve cells that are still poorly understood. However, a single drug or alcohol dose is sufficient to generate an initial stage of addiction. Recent research conducted under the umbrella of the Academy of Finland Research Programme on Neuroscience (NEURO) has discovered the same phenomenon in the dosage of benzodiazepine diazepam.

Benzodiazepines are highly effective medicines that are widely used in the treatment of anxiety, insomnia, pains, panic attacks and other symptoms. However, over time patients may develop an increased tolerance towards these medicines and an unhealthy dependence.

“Previously, addiction to benzodiazepines has been explained by reference to negative rather than positive reinforcement. In other words, the thinking has been that the reason people continue to use the medicine is that it helps alleviate their distressing withdrawal symptoms and general discomfort, rather than because it provides a sense of reward,” says Professor **Esa Korpi**, who has been in charge of the research project at the University of Helsinki.

However, according to the latest research it seems that diazepam causes a similar change in the brain’s reward-inducing dopamine cells as a dose of alcohol, morphine,

amphetamine or cocaine. Furthermore, neural message transmission in the dopamine cells is reinforced for up to 72 hours after ingestion of diazepam. “Our studies have shown that diazepam also affects the dopamine system, which adds a new positive reinforcement mechanism of reward learning to the theory of benzodiazepine addiction,” Korpi explains.

The Academy’s ongoing Research Programme on Neuroscience (NEURO) is scheduled to run from 2005 to 2009. The programme is conducted jointly with Chinese and Canadian partners. Its purpose is to support multidisciplinary neuroscience research at the highest level and to promote cooperation, networking and mobility among scientists from the countries involved in the programme. ■
www.aka.fi/neuro


Anton Sandqvist

Pregnancy situations have impact on brain development in preterm infants

Brain development in infants who are born very prematurely is still incomplete. Factors that cause premature birth may have an impact on the development of the premature infant’s brain both during pregnancy and later on after birth. A project conducted as part of the Academy of Finland Research Programme on Neuroscience (NEURO) is concerned to study brain growth and development in very premature or low-weight infants.

The central nervous system in small premature infants is highly susceptible to damage as the immature organism tries to adapt to the intensive care environment following release from the intrauterine environment. Scientists working on the PIPARI project at Turku University Hospital have followed premature low-weight infants and investigated factors impacting the growth and development of their brain as well as their two-year prognosis from pregnancy onwards. A total of 232 preterm infants have been followed and compared to 246 full-term controls. The children will be followed for a total of six years, from birth through to school age.

The results of the project indicate that the redistribution of foetal blood flow, indicative of placental insufficiency, leads to smaller brain volume in preterm infants at term equivalent age. In this situation the foetus directs a larger proportion of the blood flow to its brain.

“The mean brain volume in preterm infants with abnormal blood flow distribution was 45 millilitres smaller than in other preterm infants,” says project director, Adjunct Professor **Liisa Lehtonen** from Turku University Hospital.

According to Lehtonen, the new research evidence on the impact of this volume difference on children’s long-term prognosis will help decide the optimal timing of delivery in cases of placental insufficiency.

DEGREE OF PREMATURITY INFLUENCES RISK OF BRAIN INJURY

Scientists in Turku have studied the impact of placental inflammation on brain injury in preterm infants. It has been widely believed that inflammation of the placenta is responsible for many brain injuries in preterm infants. “We examined tissue samples from preterm placentas and classified them according to the amount of inflammation found in microscopic examinations. Inflammatory reactions were seen in 45 per cent of the placentas,” Lehtonen says.

However, the findings suggest that placental inflammation has no independent effect on the number or severity of brain injuries or on brain growth. Inflammation of the placenta is the more common the more prematurely the infant is born, and the degree of prematurity is the single most significant risk factor for brain injury.

“In order for us to create treatments that can help protect the development of the brain, it’s essential that we systematically follow up the development of preterm infants: this should always be an integral part of the care of preterm infants,” Lehtonen emphasises. ■
www.aka.fi/neuro

New strategy for the Academy: IMPACT, VISIBILITY AND STRATEGIC PARTNERSHIP

Text: Riitta Tirronen
Photos: Nina Dodd

The Academy of Finland has launched a new strategy to further strengthen its role as a major research funding agency and a leading science policy expert. At the same time, the strategy aims to enhance the impact and visibility of science and research

The need for a revised and updated strategy was dictated by changes in the operating environment and advances in science. "The world of science and research has changed dramatically. Scientific research is increasingly important to the well-being of the whole of humankind, and that's now the main focus of our operation. The same emphasis is reflected in EU policy decisions, in the Lisbon Strategy objectives and in the Finnish Government Programme," says Academy President **Markku Mattila**.

"The traditional distinction between basic and applied research is increasingly blurred, and inter-disciplinary and multidisciplinary approaches have found increasing vogue. Research questions are also becoming more and more sophisticated. In the wake of these changes, there's a growing need now to invest in high-level infrastructures and research equipment."

The Academy's new strategy places special emphasis on maintaining high-quality standards in scientific research and on practical application. "Success requires the ability to identify the most promising and talented researchers and research projects. Importantly, we must also be able to raise the overall quality of research," Mattila points out.

The Academy is keen to take a proactive role in public debate about science policy and about the goals, impact and ethics of science, Markku Mattila says

Mattila is also keen to stress the importance of monitoring the impacts of research more closely than before. Research must be in the position to make genuine breakthroughs, and it must also have demonstrable potential for scientific and social applications. Furthermore, the strategy highlights the need to support and facilitate the internationalisation of research.

"To put this strategy to work, it's essential that the Academy continue to develop its operations," Mattila says.

EXPERTISE A MAJOR STRENGTH FOR THE ACADEMY

The process to develop and draft a new strategy included extensive rounds of discussions at the Academy to identify the agency's current strengths and areas of change. "These talks involved 160 people and allowed us to create a common understanding of where we stand at the moment and where we want to go from here."

There was a broad consensus that the organisation's main strengths lie in its science policy expertise as well as in the confidence inspired by the Academy's application review and funding processes. Change and improvement was thought necessary in demonstrating the impact of research and in internationalisation.

"In the review process, we must be able to identify the best researchers and research projects and make sure they have proper funding," Mattila adds. "We've made good headway in internationalisation, but this is an area that'll continue to gain in significance. Demonstrating impact is another major challenge."

HIGH-QUALITY AND FORWARD-LOOKING

The Academy's management team has additionally listed a few key areas of development in its strategic project portfolio. Apart from the demonstration of impact, internationalisation and strategic partnership, other major areas of development include the Academy's research infrastructure policy, funding instruments, management, policy lines and information systems.

Mattila is convinced that the Academy's new infrastructure strategy will benefit infrastructure policy planning at the national level, too. The project to reform and update the Academy's information systems, for its part, will support the development of the online application process.

COMMITMENT TO DEEPEN INTERNATIONAL COOPERATION

The Academy has also reviewed and updated its international strategy, which will continue in force through to 2015. The principles are the same as have been followed in the Academy's international operations in general, but with a stronger drive to consistency and goal achievement. The international strategy was updated as part of the Academy's broader strategic review.

The international strategy is based on the idea that high-quality scientific research and the application of research knowledge is crucial to Finland's international competitiveness and to social welfare. One indication of the importance of international cooperation is provided by the role of networking, which is recognised as a key condition for the creation and development of high-quality infrastructures and research environments.

"The new strategy says that the Academy should be target-oriented, consistent and selective in its international activities. We're keen to establish strategic partnerships with leading science countries both in Europe and elsewhere, and we also have close collaboration with emerging science countries," says **Riitta Mustonen**, Vice President, Research.

"The aim is to create new opportunities for Finnish research and to increase its impact internationally."

In practice, the Academy's role here is to carve out opportunities for international research collaboration and to support the mobility of researchers. At the same time, the Academy will continue to step up its support for Finnish researchers competing for international funding. The Academy will also be working to enhance the appeal and attraction of Finnish research environments and to facilitate opportunities for foreign researchers in Finland.

TOWARDS STRATEGIC PARTNERSHIPS

Riitta Mustonen says that the Academy's international activities rest on four main pillars: permeability, strategic partnerships, impact and visibility. Permeability means that the needs and goals of internationalisation are taken into account in all Academy funding and Administration Office operations: "They're also taken into account in development activities, for instance in connection with updating research programmes and CoE strategies as well as in the development of infrastructure policy."

In line with this strategic partnership thinking, the Academy has specified the countries, regions and partners with which it wants to work most closely: these are the Nordic countries, Europe, the US, Japan as well as the emerging science powers of Russia, China, India and Brazil. Collaboration with developing science countries in Africa, for instance, may also be considered.

"Strategic partnership is always aimed at achieving mutual added value. The purpose is to exchange views and opinions, to disseminate information and to find a common line," Mustonen explains.

We're excellently placed to step up our international activities and cooperation, because Finnish research and the science funding system enjoy a good reputation internationally. The rigorous system for reviewing international applications has been instrumental in raising awareness of the high standard of Finnish science and research, Riitta Mustonen says

FINLAND WANTS MAJOR INFRASTRUCTURE CENTRE

Funding cooperation in strategic partnerships is primarily through CoE and research programmes, project funding, graduate schools, the FiDiPro programme and researcher mobility. European co-operation can be funded through joint programmes and ERA-NETs, ESFRI projects and the EUROCORES programme. In the Nordic context, important funding avenues include Nordic Centres of Excellence and NORIA-net, where the focus is to develop Asian cooperation.

"European Joint Programming is a particularly interesting option from the Academy's point of view in that the EU and the Academy take a very similar view on research programmes, i.e. they're seen not as reactive or ad hoc mechanisms, but on the contrary as proactive strategies geared to the future. I'm sure that our long-term efforts with research programmes set a good example for the implementation of joint European research programmes," Mustonen says.

Another major objective for the Academy's international strategy lies in infrastructure development. "It's important that we sort out our infrastructures in Finland. They must be internationally competitive so that we can conduct research at the cutting edge and get the best researchers to Finland."

"We're also very keen to make sure that the coordination of one major research infrastructure centre from the ESFRI Roadmap is awarded to Finland," Mustonen adds.

IMPACT MUST BE STRENGTHENED

One of the key aims of the new strategy is to strengthen the impact of the Academy's international activities. This will be achieved among other things by undertaking a greater number of bilateral calls and by intensifying international communications.

"Greater impact will mean a stronger representation of Finnish scientists and experts in international organisations and science policy processes," Mustonen believes.

The new strategy will be evaluated for effectiveness in a couple of years' time when the Academy will conduct an assessment of its international activities. The evaluation by outside experts will take place in 2010–2011. ■

Secrets of hereditary tumour predisposition fast unravelling

Text: Johanna Summanen
Photos: Mauri Ratilainen

The success of Academy Professor Lauri Aaltonen and his team at the very cutting edge of research in hereditary tumour predisposition owes largely to the unique genetic makeup of the Finnish population and a rigorous system of documenting all cancer cases in the country that goes back more than 50 years

The team is credited with identifying several major human cancer genes. A closer understanding of how these genes work will eventually pave the way to more efficient and accurately targeted treatments. "The discovery of this genetic background is the first step on the long path to medical treatments and prevention based on molecular-level knowledge," Aaltonen explains.

Aaltonen has taken an active interest in the mechanisms of inheritance ever since his days in upper secondary school. The most significant discovery of his doctoral thesis 14 years ago was the identification of a gene defect that predisposes to colorectal cancer. He says he continues to relish every challenge that research throws at him. "Research to unravel the molecular background of tumour growth predisposition due to inherited genetic mutations is providing a major boost to cancer research in general, but it can also offer immediate help to people who carry that genetic predisposition," Aaltonen says.

RESEARCH ENHANCES PREVENTION OF CANCER

Aaltonen's team has established genetic links among others with intestinal cancer, renal cancer, uterine leiomyomatosis and with predisposition to pituitary tumours. If the genetic background of tumour susceptibility can be established in a certain family, then it will also be possible to identify, among those at risk, the family members who have inherited the genetic defect. Those individuals can then be encouraged to seek regular check-ups and possibly receive preventive care.

"The purpose is obviously to pick up any tumours at the earliest possible stage and to alter the course of the disease. Indeed, prevention is one of the most valuable practical applications of genetic information," Aaltonen says.

"In the case of colorectal cancer, morbidity and mortality in intensive follow-up groups is markedly lower than among persons at risk but not receiving regular follow-ups."

COMPREHENSIVE REGISTERS: AN INVALUABLE SOURCE OF INFORMATION

The Tumour Genomics Research Group is painstakingly analysing all 800,000 cancer cases entered in the National Cancer Registry to provide a systematic analysis of genetic tumour susceptibility. The registry lists some 600 different types of cancer. Designed in collaboration with Professor **Eero Pukkala**, Statistical Director of the Cancer Registry, the project is focused on different cancer clusters. As the team also has access to data from the Central Population Register, it is excellently placed to study the impact of place of birth and other demographic items on how different tumours are clustered.

"If the observed number of cancers in a certain cluster deviates sharply from expectations, then we'll try to establish whether hereditary predisposition is involved," Aaltonen explains.

Practising GPs are an important link in generating research impulses.

A good atmosphere in the workplace is crucial to the success of the whole research team, Aaltonen says. Anniina Raitila introduced the idea of an annual risk analysis that covers both workplace ergonomics and risk factors for physical and mental stress

"We often get contacted by doctors who've come across families with an unusually high incidence of cancer."

TECHNOLOGY OPENS WINDOWS

The technology used in genetic research has improved dramatically in the past few years. The development and lowered costs of DNA chip methods have paved the way to more extensive and in-depth investigations of genotype.

"Just a few years ago these kinds of breakthroughs in cancer research would've been unthinkable. In the past couple of years there have been dozens of new discoveries: the new methods have opened the window to susceptibility genes for common diseases," Aaltonen adds.

Aaltonen says he has followed with some frustration the recent growth of commercial operators running online genetic information resources for private individuals.

"Of course it's fascinating stuff, but without expert interpretation the results are certain to give rise either to undue concern or to a false sense of security."

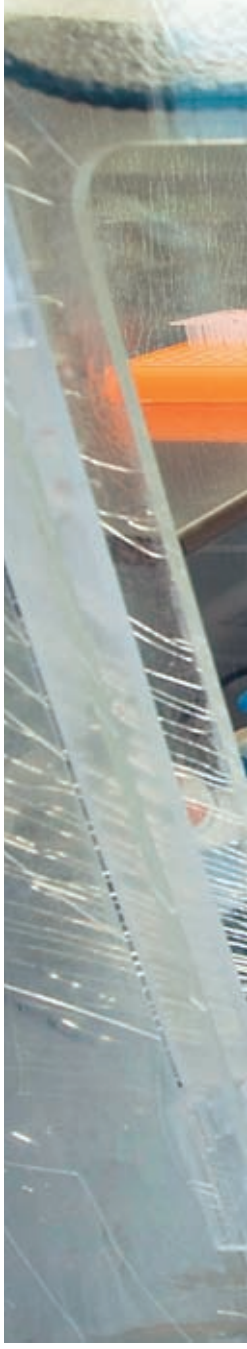
GREAT ATMOSPHERE, GREAT RESULTS

All in all, there are 25 members on Aaltonen's team, five of whom have completed their PhD and more than ten are in the process of researching their PhD. The contribution of auxiliary staff is also significant.

"The supervisor's role is one of great importance to the future of every young researcher. The process of researching and writing one's doctoral thesis is one of learning how to do science and how to succeed in the research community. And of course the quality of work is paramount – the only relevant benchmark is the international cutting edge," says Aaltonen, Academy Professor since 2002.

As well as having won several awards for their research, Aaltonen's team were honoured in 2005 with the University of Helsinki Occupational Health and Safety Award. An inspiring and motivating atmosphere in the workplace provides a great lift for research itself.

"One of my most important jobs is to foster a sense of team spirit and to get everyone onboard. These efforts to create and maintain a positive atmosphere don't detract one iota from our scientific work, on the contrary, they support the making of new discoveries," Aaltonen believes.



It's wonderful to work with Finnish people, not just because of their interesting genes but also because of their positive attitude, says Academy Professor Lauri Aaltonen

COOPERATION GENERATES SUCCESSES

Aaltonen's research team is one of six that make up the Academy's Centre of Excellence in Translational Genome-Scale Biology, which is focused on

Jaana Tolvanen is working to determine the sequence of a cancer gene by polymerase chain reaction

researching the impact of the human genome on cell growth and the premature ageing of cells. All in all, the group of six research teams represents a broad spectrum of expertise in biosciences, medicine and technology.

"Our own work has a rather strong clinical orientation, so the support we get within the CoE for functional experiments, for instance, is invaluable. It's impossible to master all the skills needed in the research process from beginning to end."

The close and active cooperation among the CoE research teams also helps identify potential new research themes.

"For instance, our collaboration with other teams to explore the functional consequences of cancer gene mutations is extremely fruitful."

"But above all, we owe a very special debt of gratitude to all the people who have taken part in our studies. It's wonderful to work with Finnish people, not just because of their interesting genes but also because of their positive attitude," Aaltonen concludes. ■

Review of state and quality of science in Finland underway

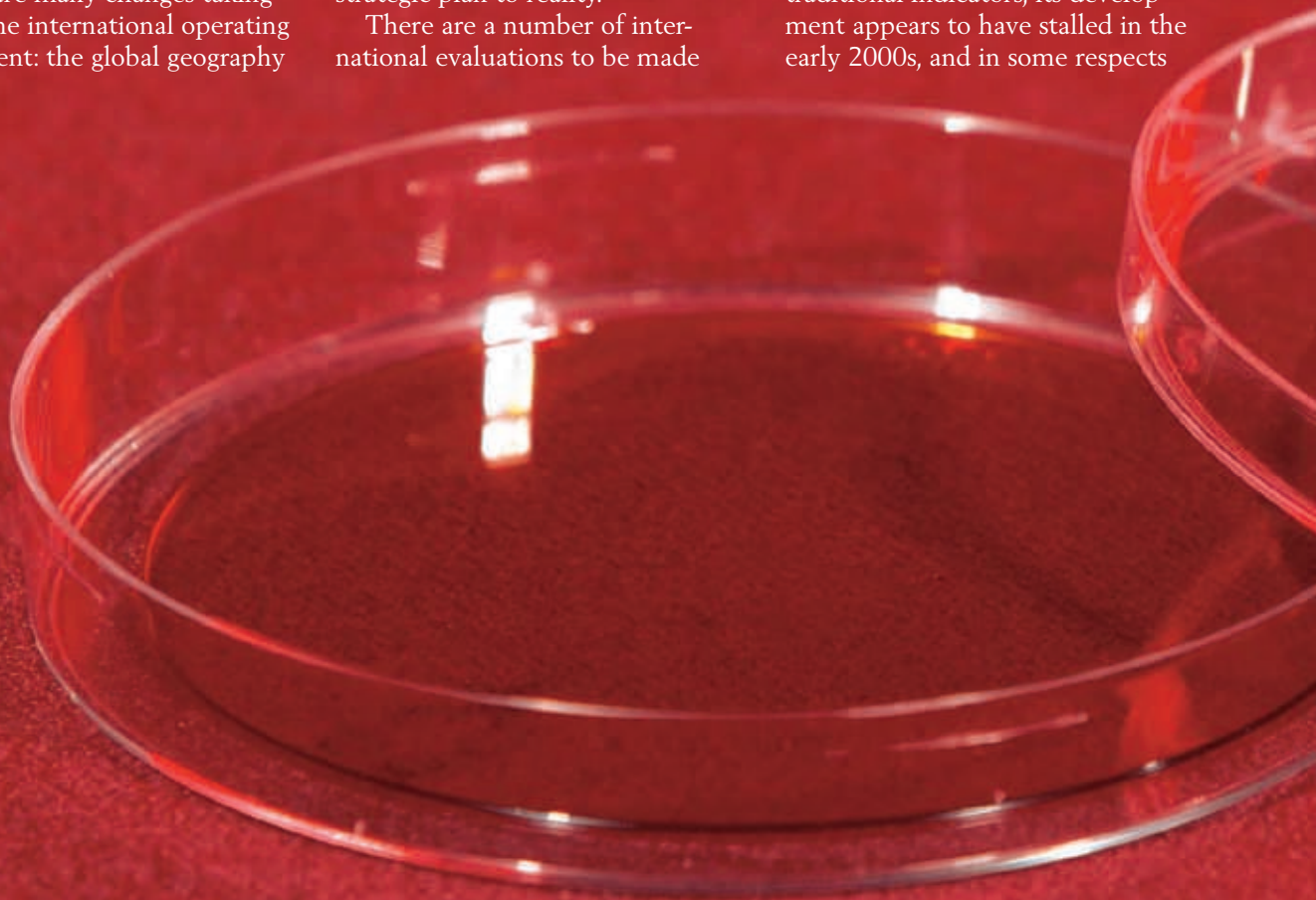
Text: Paavo Löppönen

The Academy of Finland has issued a review of the state and quality of science and research in Finland with regular intervals – every three years since the late nineties. The next report, entitled SIGHT 2009 and published in both Finnish and English, is due to come out in the autumn of 2009. The work is run by a steering group chaired by Academy President **Markku Mattila**. Members also include the chairs of the Academy's four Research Councils.

There are many changes taking place in the international operating environment: the global geography of science is changing quite rapidly, with new countries and regional clusters steadily making their way onto the world map of research; both traditional and emerging science countries are adopting a new breed of solutions for science and innovation policy; international funding and research cooperation is on the increase; and researchers and other experts are becoming more mobile. Furthermore, within the scope of five years, the European Research Area (ERA) will go from strategic plan to reality.

There are a number of international evaluations to be made within the framework of SIGHT 2009 that will help define Finland's position on the science map. At the same time, the goal is to chart different solutions as to how best to respond to the challenges that in one way or another are also facing the Finnish research and innovation system.

The internationalisation of the Finnish research and innovation system has long been a stated objective of official science and technology policy in Finland. Measured with traditional indicators, its development appears to have stalled in the early 2000s, and in some respects



even regressed. One of the goals of the SIGHT 2009 project is to form an up-to-date review of this internationalisation and its key processes.

GOING FOR THE BIG PICTURE

The Finnish research and innovation system is in the midst of a number of processes that in the long run will have a significant impact on the organisation and funding of scientific research. In April 2005, the Government outlined the principles and objectives for the structural development of the public research system. The decision-in-principle was the starting point for the structural development of Finnish universities and research institutes as well as for the work to establish Strategic Centres for Science, Technology and Innovation.

Universities are the Academy of Finland's primary strategic partners; this is also stated in the Academy's strategy. They hold a key position in terms of the standard and quality of scientific research conducted in Finland. Set against this backcloth, the SIGHT 2009 report seeks to build an overall view of how the universities' preconditions for research are being developed.

The Academy's Research Councils have a high vantage point out over their own disciplines. They regularly evaluate the state and quality of scientific research in Finland and also make the funding decisions. Within the scope of SIGHT 2009, the Research Councils will assess Finland's scientific strengths and weaknesses. These assessments will also include an estimate of how the availability and quality of research infrastructures will affect the situation.

Strongly emphasised in the Government's decision-in-principle is the role of impact as a key criterion in the development of the public research system. In the decision, the overall responsibility for impact evaluation is placed on the Academy and Tekes. The two organisations have consequently embarked on a project that aims to 1) construct an impact framework for science, technology and innovation, 2) define a set of key indicators with which to measure impact, and 3) issue a report that through these indicators details the changes in knowledge and know-how and their effects in Finland. The impact framework is set to be completed in October 2008 and the report will be ready in 2009. They will be used to an appropriate extent also in the preparations for the SIGHT 2009 project. ■

Paavo Löppönen is Director of Development and Evaluation at the Academy of Finland.

Discipline evaluations – a means to advance research

Text: Riitta Tirronen

Comprehensive evaluations of disciplines and individual fields of research are an important tool for research and science policy development. The Academy of Finland has completed and published discipline assessments since 1983

"The objective of evaluation is to gain an expert and independent view of the state of the discipline in question, of the quality of its research and of its development needs. The main purpose of discipline assessments is to give feedback to the scientific community and to funding agencies," says Senior Science Adviser **Hannele Kurki** from the Academy of Finland.

Researchers and experts appointed to the Academy's evaluation panels come invariably from outside Finland. Foreign experts are best equipped to analyse Finnish research and the research system from an international, comparative perspective. "All experts," Kurki adds, "are expected to be well-respected names in the field concerned, and they must have good experience in science policy."

Kurki tells that initiatives for discipline assessments typically come from the research community, the Academy's Research Councils, other research funding agencies or from authorities. "The Academy is widely recognised for its activity in the evaluation of individual disciplines and fields of research, and so organisations representing the scientific community most often submit their evaluation initiatives directly to the Academy or to the appropriate Academy Research Council."

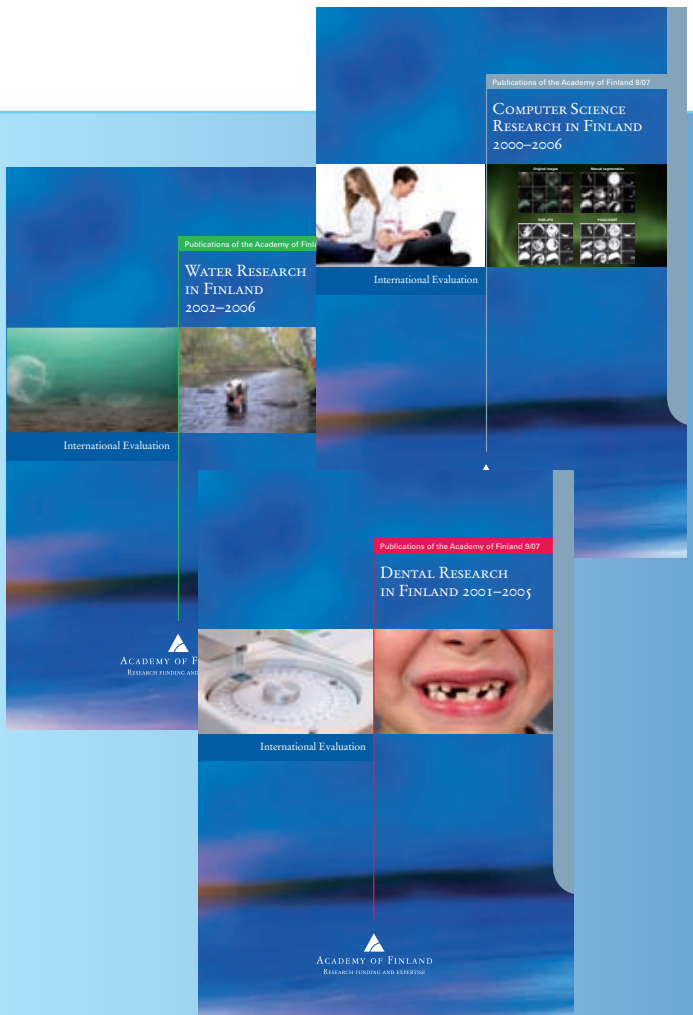
At Research Councils, initiatives for assessments often come about in connection with the work to prepare development plans, research programmes and reviews of the state and quality of scientific research. An evaluation often also marks the beginning of or follows up a development effort in a certain field of research. "One important use of discipline assessments is in the preparation of new Academy research programmes," Kurki says. "The evaluation of food sciences, for instance, supported the preparations of the Academy's Research Programme on Nutrition, Food and Health (ELVIRA), and the evaluation of energy research set up the work for the Sustainable Energy Research Programme (SusEn)."

NEXT UP: ARTS RESEARCH

Since the early 1980s, the Academy has completed more than 20 discipline and research field assessments. The latest that were published include the evaluations of computer science, dental and water research. In September 2008, the evaluation of mechanical engineering research in Finland came out. This evaluation is part of the evaluation of technical sciences conducted by the Research Council for Natural Sciences and Engineering. Earlier in the same series, the Academy carried out evaluations of energy research and computer science research. Currently in the pipeline is the evaluation of arts research in Finland.

"The purpose of these evaluations is to provide information on the international standing and quality of Finnish research. In addition, they are a way to identify the strengths and weaknesses of the discipline or research field concerned and to explore the underlying reasons," Kurki says.

Assessments such as these also help identify development needs and make recommendations to researchers, research organisations and funding bodies on how to raise the quality of research. "Ultimately," Kurki concludes, "discipline assessments also provide information on the societal, technical and economic impacts of research." ■



The latest discipline evaluations in the Academy of Finland publication series:

- 8/07 Computer Science Research in Finland 2000–2006. International Evaluation
- 9/07 Dental Research in Finland 2001–2005. International Evaluation
- 1/08 Water Research in Finland 2002–2006. International Evaluation
- 5/08 Mechanical Engineering Research in Finland 2000-2007. International Evaluation

www.aka.fi/publications > Publication series

Finns score big in competition for ERC funding

Text: Jukka Muukkonen
Photos: Mauri Ratilainen

Young Finnish researchers have found excellent success with their applications for European Research Council (ERC) funding. The first ever application round for ERC funding was directed at young researchers seeking career independence

After completing her PhD, Research Professor Johanna Ivaska worked for a spell at the prestigious Cancer Research UK London Research Institute. From London, she moved to the post of Academy Research Fellow at VTT Finland

ERC Starting Grants were awarded to nine Finnish researchers. The successful projects comprise a wide range of subjects from cancer research to the history of philosophy, acoustics research, ecology and space research.

The maximum ERC funding term is five years and the maximum amount of funding for a single project 2.5 million euros. In the first round of applications, the ERC received more than 9,000 applications, 230 of which came from Finland. Funding was awarded to some 300 projects, or 3 per cent of applicants.

"ERC grants are a new funding instrument that's intended to achieve the same purpose that the Academy serves. The Academy has been closely involved in promoting this type of funding mechanism," says Academy President **Markku Mattila**.

ERC grants are intended to support investigator-driven, high-quality scientific research conducted in small teams. Funding is awarded on the basis of scientific quality. The aim is to further raise the standard of European research and to bolster its competitiveness globally.

ERC grants are awarded to individual researchers, who will then select the best members for their team. There are two grant schemes, ERC Starting Grants for young researchers and ERC Advanced Grants to support established researchers.

I'm sure that the excellent reputation of Finnish research in the history of philosophy and new research breakthroughs contributed to the ERC funding decision we received. No doubt the ERC also wanted to support the repatriation of European researchers, Taneli Kukkonen says

NEW TARGETED CANCER DRUGS

Research Professor, Academy Research Fellow **Johanna Ivaska** is concerned in her research with the movement and spread of cancer cells. Her funding application outlined three different approaches to acquiring new knowledge about the function of cancer cells.

"What we want to do is gain a clearer understanding of how cell adhesion receptors work and impact the growth and division of the cell and how they influence the spread of cancer. This is basic research in cell biology that is aimed at explaining how cells function and what goes wrong when cells are transformed into cancer cells," Ivaska explains.

There are hopes that the accumulating research evidence will pave the way to new drugs for the treatment of cancer. The development of new drugs is a time-consuming and expensive business, but it also yields important insights into how drugs work.

"The targeted cancer drugs that are in use today have been developed from basic research findings 15–20 years ago," Ivaska points out.

The Cell Adhesion and Cancer Research Team under Research Professor Ivaska includes seven doctoral students working on their doctoral thesis and two bioanalysts. Based at the VTT Medical Biotechnology Knowledge Centre in Turku, Ivaska's team was awarded 1.5 million euros in ERC funding for a five-year term.

LONG-TERM FUNDING IS VITAL

Ivaska is keen to stress the importance of the ERC grant her team has received.

"It'll allow us to focus all our attention on this challenging field of research for the next five years. New ambitious lines of research in cell biology are slow and expensive and require a great deal of transdisciplinary expertise. It's impossible even to get started on a genuinely new line of inquiry without the certainty of long-term funding," Ivaska describes.

"This funding will also put us in the position to conduct internationally competitive research in Finland. In the US and elsewhere, this type of funding has already been available for a long time. Long-term funding allows us to take greater risks, which means there's also potential for more significant results."

Ivaska believes that the ERC wanted above all to support audacious but credible and interesting research projects.

"You must have other sources of funding as well, but the ERC grant certainly provides a sound foundation for long-term planning. Three members on our team will be taking their PhD in the near future. The ERC grant will allow us to recruit postdoc researchers, for instance."

OPPORTUNITY TO BUILD UP A RESEARCH COMMUNITY

"ERC funding will allow us to attract and retain the best talent in Finland. It means we can start building up a research community, safe in the knowledge of financial

security," says **Taneli Kukkonen**, Professor of Antiquity at the University of Jyväskylä.

Kukkonen was granted 750,000 euros in ERC funding for his four-year project. He will be using the grant to hire two postdoctoral researchers and two doctoral thesis writers.

"This project forms an integral part of the strong Finnish research tradition in the history of philosophy and the history of ideas. Our main interests lie in the theme of selfhood and in philosophical concepts of man in European and Arabic culture: we want to compare them and study their evolution in the history of ideas from antiquity to modern times."

Scholars in Latin and Arabic history of ideology are equally represented on the team, which Kukkonen says means there is a good opportunity for real breakthroughs.

"We're now in the position to offer two top-level PhD students the chance to take a longer-term focus on their work. We'll be advertising the vacancies internationally," he adds.

Academy Research Fellow Tapio Lokki and his team will be developing models of how sound advances in different space. The results will have application in the design of acoustically demanding spaces

ARABIC AND WESTERN CULTURES HAVE COMMON ROOTS

In 2003–2007, Kukkonen was employed as Research Professor in the Aristotelian tradition at Victoria University in Canada. Since 2007, he has held the position of Professor of Antiquity at the University of Jyväskylä Department of History and Ethnology.

He is also involved in the Centre of Excellence in Philosophical Psychology, Morality, and Politics, jointly administered in 2008–2013 by the Universities of Helsinki and Jyväskylä. Kukkonen's research interests have ranged from the philosophy of antiquity and history of ideas through the Aristotelian tradition in the Middle Ages and the Renaissance to Islam theology.

"Our modern Western concepts of man today are grounded in the concepts that originate in Antiquity. For instance, the dialogue between Christianity, Judaism and Islam that has recently received so much prominence in the media, requires a close understanding of the assumptions in these religious traditions about human nature and their interpretations of sacred texts. Arabic philosophy is an integral part of the Western history of ideas," Kukkonen points out.

VIRTUAL ACOUSTICS HELPS DESIGN BETTER CONCERT HALLS

For virtual acoustics researcher **Tapio Lokki**, ERC funding means he can hire three researchers on his

team for a five-year term.

"This is a significant source of funding because it gives continuity to our research. A bigger team means we can now set up bigger projects. We can also tackle more demanding and time-consuming problems," Lokki says.

Currently working as Academy Research Fellow and Adjunct Professor at TKK, Helsinki University of Technology, Lokki has received ERC funding worth 880,000 euros for five years.

Lokki's team will consist of six doctoral students working on their theses. The focus of their research will be on physical modelling techniques for virtual acoustics, the aim of which is to better understand and predict the acoustics of concert halls and other acoustically demanding spaces.

The team have three main research themes. One of them is the development of new objective parameters and subjective terminology with which acoustical conditions can be more accurately measured, assessed and described.

The group will also be working to develop methods for modelling room acoustics and auralisation, a kind of acoustic 3D simulation method.

"Auralisation is a design tool for acoustically demanding spaces. It allows us to hear, at the design stage, what the acoustics will eventually sound like in the completed space."

The team's third main area of research is augmented sound reality, in which the natural sound environment can be shaped by means of signal processing.

ERC PERSUADED BY TRANS-DISCIPLINARITY AND NEW IDEAS

"Our results will have application not only in concert hall acoustics but also elsewhere, such as home theatres, sound studios and libraries," Lokki says.

Lokki has first-hand experience and understanding of concert hall acoustics in that he has played with a symphony orchestra for more than ten years and also conducted the student orchestra Retuperän WBK.

"I'm sure the reason why we were successful with our application had to do with the transdisciplinary nature of our research themes and our innovative approaches. Our work combines the methods and thought models of various disciplines. For instance, we've applied graphics and visualisation algorithms to acoustics," Lokki says. ■

Otso Ovaskainen, Tapio Lokki, Taneli Kukkonen and Johanna Ivaska were among the first successful young Finnish researchers to get ERC Starting Grants

ERC Starting Grants were awarded to nine Finnish researchers and their projects:

- **Greenlees Paul, University of Jyväskylä: Understanding the Structure and Stability of Heavy and Superheavy Elements**
- **Hemminki, Akseli, University of Helsinki: Oncolytic Adenoviruses Expressing Monoclonal Antibody Trastuzumab for Treatment of Her-2+ Cancer**
- **Ivaska, Johanna, VTT: Spatially and Temporally Regulated Membrane Complexes in Cancer Cell Invasion and Cytokinesis**
- **Kukkonen, Taneli, University of Jyväskylä: Subjectivity and Selfhood in the Arabic and Latin Traditions**
- **Kurki, Milja, Aberystwyth University, UK: Political Economies of Democratisation**
- **Lokki, Tapio, TKK: Physically-based Virtual Acoustics**
- **Lummaa, Virpi, University of Sheffield, UK: Mothers, Grandmothers and the Evolution of Prolonged Lifespan in Humans**
- **Ovaskainen, Otso, University of Helsinki: Spatial Ecology: Bringing Mathematical Theory and Data Together**
- **Palmroth, Minna, Finnish Meteorological Institute: Quantifying Energy Circulation in Space Plasma**

How does transferring a gene into a plant affect the plant's other genes and thereby its metabolism? This is what researchers in a project headed by Professor Teemu Teeri have been working to investigate within the research programme ESGEMO

Text: Riitta Tirronen
Photos: Nina Dodd

Well-researched facts on the metabolism of transgenic plants

Transgenic crops have been grown for more than ten years now and, during this time, the areas of cultivation for genetically modified crop plants have steadily increased in size worldwide. Genetic modification using gene transfer (GM) has been used as a research and breeding tool for plants since the technology was first introduced more than twenty years ago. As the cultivation of GM or transgenic plants has increased, so too has public concern over the effects of these new techniques on the environment, biological diversity and human health. The impact of genetically modified organisms (GMOs) on the environment, animals and humans has in fact become one of the most important issues for current research in the field.

"It's crucial that we study whether GM breeding entails any risks that don't occur in traditional plant breeding," says Professor Teemu Teeri from the University of Helsinki.

Risk prediction and the necessity of risk analysis are also reflected in GMO legislation. Teeri says that, in comparison to the traditional methods of breeding, the use of transgenic techniques is regulated by what can be described as quite draconian laws, reflecting a strong precautionary principle. "In other words, the GMO industry is highly regulated, as if to predict possible problem areas. However, no problems have as yet been observed."

Teeri reports a consensus among researchers that the perceived risks are real, for example, when studying metabolic variation in transgenic plants. "But the same problems occur in ordinary breeding, for example, in interbreeding. GM breeding techniques are in fact more precise than traditional methods, since they typically involve modifying only one gene at a time."

"It's important to examine whether plants, animals or the environment in general undergo any changes that haven't been predicted. An expert can of course make an educated guess that nothing out of the ordinary or revolutionary will occur, but that simply isn't enough. You need hard evidence and well-researched facts," Teeri emphasises.

INFORMATION ON THE FUNCTION OF AN INDIVIDUAL GENE

Launched in 2004, the Academy of Finland's Research Programme on Environmental, Societal and Health Effects of Genetically Modified Organisms (ESGEMO) was a response to the need for new research knowledge. The project headed by Teeri was one of the research projects funded under the programme.

The aim of the project was to research changes in secondary metabolism and gene expression of genetically modified varieties of the gerbera plant. Secondary metabolites, in other words products of secondary metabolism, may include plant pigments and aromatic and flavour compounds.

Ecologically, secondary metabolism affects plants' defence mechanisms against diseases and their interaction with pollinators.

Teeri's team has 15 years of experience in researching the developmental biology of gerbera and secondary metabolism. Their greenhouse at the Viikki Campus of the University of Helsinki includes a great collection of gerberas with a number of transgenic gerbera lines.

The gerbera variety Terra Regina was originally selected as a model plant due to its laboratory characteristics, and according to Teeri it has since proven to be a rewarding target for study. For example, with its inflorescence of three different types of flowers, it is of far more interest in terms of developmental

biology than thale cress (*Arabidopsis thaliana*), the plant typically used as a model organism.

Breeding transgenic plants makes it possible to study the function of individual genes. Researchers can, for example, add a new gene to a plant, "turn off" a gene, or make it function incorrectly. This helps in understanding the effects of each gene on the plant's function or on its interaction with the environment.

It's crucial that we study whether GM breeding entails any risks that don't occur in traditional plant breeding, Professor Teemu Teeri says

GREATER VARIATION BETWEEN DIFFERENT STRAINS

The ESGEMO project headed by Teeri was focused on the occurrence of gerbera-produced bitter compounds in different strains, flower toxicity and bees' reactions to transgenic gerbera.

"The same bitter-tasting compound is found in both gerbera and rowan berries and the plants use it as protection against insect pests. While studying the secondary metabolites of gerbera and the genes involved, we discovered a key gene responsible for the biosynthesis of two bitter compounds, gerberin and parasorboside. No one knew of this biosynthesis before," says Teeri.

Teeri and his team of researchers made the discovery when they turned off the gene in the transgenic plant that affects the formation of bitter compounds. Because bitter compounds are also linked to the persistence of grey mould (*Botrytis cinerea*), the researchers noticed that transgenic plants are also highly susceptible to grey mould. In fact, they believe that the composite bitter compound found in gerbera could be used in resistance breeding of field crops and garden plants.

"Working together with **Pia Vuorela** from the Faculty of Pharmacy at the University of Helsinki, we also studied the toxic effects of GM gerbera, that is, whether the flowers start showing indications of toxicity. Through extensive chemical screening we were eventually able to show that transgenic plants don't become particularly cytotoxic. GM flowers show the same variation in and impact on cell growth as non-GM flowers, and the similarities can be seen between different strains as well," Teeri reports.

"We made the same observation for the flower's metabolic variation. There's more variation between different strains than between a transgenic and non-transgenic plant."

The researchers in the project also wanted to study how bees as pollinators react to transgenic gerbera. Bee researcher **Kamran Fakhimzadeh** from the Ruralia Institute of the University of Helsinki also participated in the project. *What did the bees think? Was pollen and nectar from transgenic plants as good as that from ordinary plants?*

"Apparently so. We did a flight experiment, where we modified a glasshouse into a gauze tent and used two beehives, sunflower plants as well as GM and non-GM gerbera to observe bees' feeding preferences. Bees are highly sensitive to changes, which affects their feeding habits, for instance. However, in this experiment, the bees found all flowers equally palatable," Teeri says.

INTERACTION THE BEST PAYOFF

For Teeri, the best thing about participating in the ESGEMO research programme is quite clear: the chance to interact with other researchers. "The major benefit has been the new insights and perspec-

tives provided by researchers from other fields, such as ecologists and entomologists."

"We gained further added value in that the programme was – from a research perspective – well in line with our areas of interest. That's to say, the objectives of the programme and our research interests converged very nicely indeed."

"Thanks to ESGEMO, we also got more media exposure than ever before. I myself also got a chance to appear in various media in connection with our research topic," Teeri sums up.

He rests assured that future research can benefit from the knowledge and methods produced within the ESGEMO project, for example, when testing and improving plant disease resistance.

Transgenic techniques still have a lot offer to future research, Teeri says – even on a global scale. "With new breeding technologies we could develop plant varieties for developing countries – varieties that are adapted to local conditions and cultivation methods." ■

Following the undeniable successes in Finland

When one moves abroad there are various phases of adjustment one goes through – initially one becomes fascinated with the new country and sees all the advantages over the familiar environments of home. Once the novelty wears off, it's said that one exaggerates the negative aspects of the new country and culture in one's mind's eye, but that after one successfully survives this morning-after hangover, one accepts the bitter with the better, and reach a stable and healthy equilibrium.

The timing of my being requested to write this article about my experiences with life and science in Finland comes for me at a less than ideal time, as I'am now waking up to see *Suomi-neito*, the Maiden of Finland, without her make-up on, after spending my first year living and working independently in Finland. Of course, this is a transitional phase until I get used to seeing her, warts and all, and now they seem exaggerated because of the culture shock and frustrations inevitably associated with immigration.

Personally, I've been a frequent visitor to Finland since 1992, when I was a very, very young graduate student. Since that time, I've spent an average of 1–2 months a year in Finland, split across 3–4 visits. I was infatuated with the country, the people, the culture, the work environment, the climate (my first visit was during an October blizzard), and especially the cuisine (yes, unlike Jacques Chirac, I absolutely love *läskisoosi, kalakukko* and *makkaraperunat*).

On a professional level, working in Finland was an amazing experience for me as a young student, because scientists were taking advantage of Finland's unique population and family resources to apply experimental strategies that were unthinkable in Southwestern Europe and the US. At the time I started here in the early 1990s, there wasn't a lot of funding in human genetics, but people made more advances here than in the US because they were forced by austerity to be creative and exploit the natural experiment that characterized the Finnish population history.

As a statistical geneticist, I was provided with many novel and interesting questions to which I could apply my quantitative modeling skills, and without doubt both I and my Finnish colleagues benefitted from this collaborative relationship synergistically. Working here, I was exposed to statistical and population genetic issues that scientists working elsewhere never thought about much until recent technological advances enabled them to see the same phenomena in their own populations. These observations have recently been re-discovered to great fanfare by scientists working in larger populations outside of Finland, by many of the same people who had earlier claimed these phenomena weren't likely to be generalizable or relevant outside of small isolates.

Of course, following the undeniable successes in Finland most US-based geneticists have sought collaborations outside the US where more appropriate populations for genetic study can be found. Finland taught the world a lesson that it seems to have forgotten itself in its recent drive to emulate the 'big science' and 'technology-driven' efforts promoted by the larger countries in Southwest Europe and the US.

I was further impressed by the educational system in science in Finland, and its 'big picture' emphasis on thinking and understanding all aspects of a problem. This was in stark contrast to the 'trade school' micro-specialization mentality of human genetics training in the US, where most Ph.D. students working in gene mapping projects have the same amount of creative scientific input on their projects as lab technicians who aren't receiving a Ph.D. for the same work. In the early to mid-1990s, when I was myself a student, I was very impressed by the way Finnish students were much more interested in discussing science in a more philosophical and 'out-of-the-box' manner. That is to say they were more interested in the whats and whys of science than the hows of engineering. I don't intend to trivialize the latter. Engineering and technology are critically important – perhaps more important to society than science.

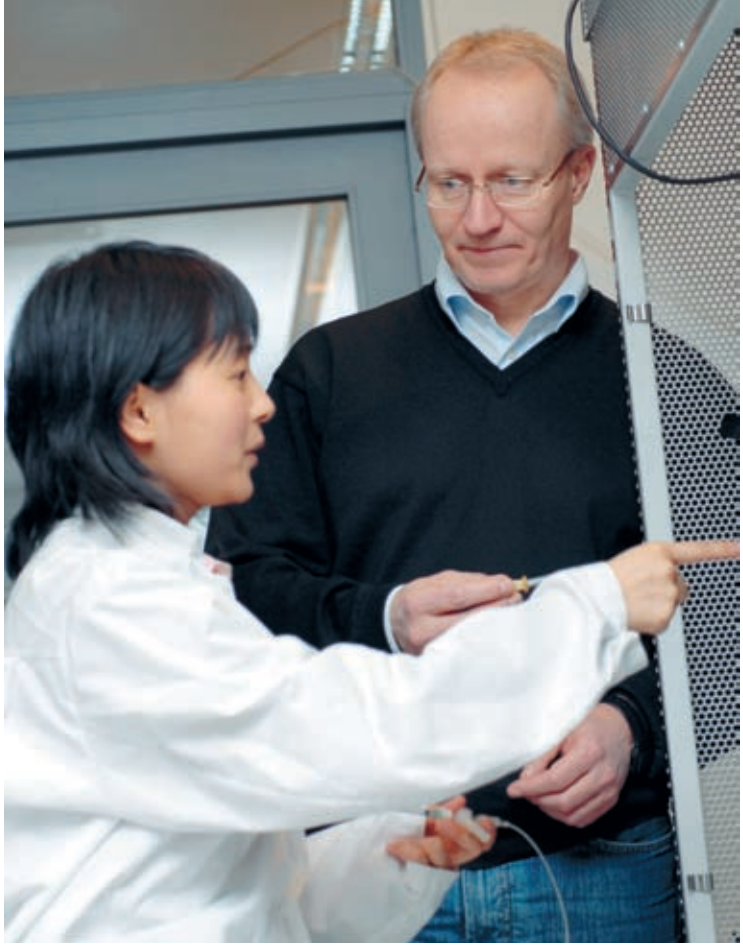
However, the goals of human geneticists are scientific – to use technology to ask questions about nature. Many of those Finnish students I speak of have now gone on to promising careers in Finnish academia. I would hope that the Academy of Finland devotes equivalent effort to promoting and supporting the career development of these highly talented young Finnish scientists as they do in recruiting foreign experts, as the biggest problem in Finnish academia is that there aren't enough positions for the many talented young scholars to return to after successful postdocs abroad. More opportunities should be provided to them, as their freedom to explore scientific areas of their own interests represent the most promising prospects for the future of science in Finland. The greatest scientific discoveries are always made by the youngest, freest minds working without the biases and vested interests of the entrenched scientific establishment.

American universities are run more like businesses than centers of intellectual inquiry, and there's enormous pressure to spend one's time trying to bring in more and more money, rather than actually teaching and doing research. This has led to an academic culture in which 'big science' is overvalued. In Finland, the bias seemed to go in the opposite direction, in that career success is evaluated by an equally unfair standard – the number of publications. As I had published tons of papers at minimal monetary cost, I obviously saw the Finnish model as one in which I could thrive. And the opportunity to thrive was provided to me initially through a visiting professor position I held at the University of Helsinki from 2003 to 2006, through which I also received a research grant from the Academy of Finland, and more recently this opportunity has been expanded and extended through the generosity of the Academy's FiDiPro program through 2010.

This extremely generous program has afforded me the opportunity to expand my research activities in Finland and to collaborate with more research groups by funding the students and staff I need to make my research happen. In the US, I had more than enough funding as well, but because the dollar amount wasn't large, I received little administrative support, in such areas as hiring and obtaining space for the staff I attempted to hire. This represented a huge advantage of the Finnish system, that I had talented and helpful administrative assistants working with me to navigate the financial side of things (though getting an accurate detailed accounting of transactions and balances on the grants has been surprisingly challenging). I honestly hope to make optimal use of this opportunity, and hope to have the opportunity to extend this collaborative relationship once this funding runs out after 2010, as I'm grateful for the opportunity to work collaboratively with my Finnish colleagues and friends.

My experiences living in a society that values social conformity and harmony over individual rights and freedoms here in Finland have made me even more American and more libertarian than I was before I came here. As I said from the outset, my current mindset is admittedly biased by the phase of the immigrant adjustment cycle I find myself in at the moment, and surely with the passage of time, the warts underneath *Suomi-neito's* make-up will become endearing, and the passion I felt for her since my first visit will inevitably reassert itself. ■

Joe Terwilliger is a Finland Distinguished Professor (FiDiPro) working in the University of Helsinki



Professor Esa Korpi's research team has joined forces with Chinese researchers to study neurobiology

Research collaboration with China

Internationality is an integral part of the Academy of Finland's activities. The Academy works to support and facilitate internationally high-quality research, researcher training and attractive research environments.

The Academy of Finland sees China as one of its key strategic cooperation countries.

The Academy has published a new brochure on research collaboration with China. The brochure gives an introduction into opportunities for high-level research collaboration with China. The possibilities include joint research projects, strategic initiatives, researcher mobility grants and the Finland Distinguished Professor (FiDiPro) programme.

Academy of Finland Publications

Annually, the Academy publishes several reports in its publication series on science and research policy as well as on research funding and the state and quality of scientific research in Finland. Recent reports in the series and other Academy brochures in English include:

- 1/08 Water Research in Finland 2002–2006. International Evaluation
- 2/08 Future Electronics Research Programme TULE 2003–2006. Evaluation Report
- 3/08 Research Programme on Environmental, Societal and Health Effects of Genetically Modified Organisms 2004–2007 (ESGEMO). Evaluation Report
- 4/08 Research Programme on Social Capital and Networks of Trust 2004–2007 (SoCa). Evaluation Report.
- 5/08 Mechanical Engineering Research in Finland 2000–2007. Evaluation Report.

BROCHURES

- Academy of Finland Annual Report 2007
- Academy of Finland International Strategy 2007–2015
- Finnish Programme for Centres of Excellence in Research 2008–2013
- Finland Distinguished Professor Programme: Teaming Up with the Best
- Research Collaboration with China
- Research Collaboration with India
- Academy of Finland brochure (available also in Swedish, German, French, Spanish, Russian, Chinese and Japanese)

The reports and brochures can be read online at www.aka.fi/publications in pdf format or ordered free of charge from the Academy's Communications Unit by phone +358 9 7748 8346 or by e-mail viestinta@aka.fi. ■

GOVERNMENT R&D FUNDING TOTALS €1.8 BILLION IN 2008

In the Finnish Government Budget 2008, the total appropriations or outlays for research and development amount to 1,798 million euros. The increase from the previous year is 68 million euros. R&D funding increases in nominal terms by 3.9 per cent and in real terms by approximately 0.7 per cent. The proportion of funds allocated to R&D activities of overall government spending exclusive of debt servicing stands at 4.4 per cent. The share of public R&D funding of GDP falls to 0.95 per cent.

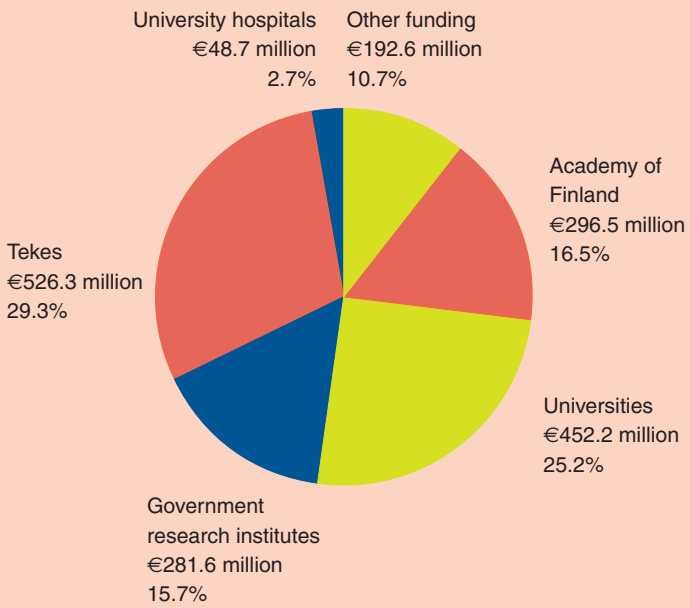
The R&D funding under the Ministry of Education increases by 27 million euros from the year before to a total of 778 million euros. The funding under the new Ministry of Employment and the Economy totals 673 million euros. Even excluding the sums transferred from the Ministry of the Interior and the Ministry of Labour, the funding under the Ministry of Employment and the Economy increased the most among all administrative sectors (by €34 million), if compared to the former Ministry of Trade and Industry. R&D funding increases significantly also in the administrative sector of the Ministry of Defence, but decreases by nearly four million euros under the Ministry of Agriculture, the Ministry of Social Affairs and Health, and the Ministry of the Environment.

The share of the Academy of Finland, which is one of the organisations awarding funding on a competitive basis, increases to over 16 per cent and its total funding amounts to 297 million euros. The other R&D funding organisation, Tekes, grants funding to the amount of 526 million euros, and its share is 29 per cent. The research funded by the Academy of Finland, Tekes and, for example, ministries, receives an increase of roughly 20 million euros in 2008.

In line with the socio-economic objective, the general advancement of knowledge is the largest category with its share of 42 per cent. It also receives the largest increase in 2008, namely 25 million euros, which consists mostly of research funding granted by the Academy of Finland. The share of funding of industrial production and technology is 27 per cent and that of social structures and relationships 15 per cent.

FUNDING DECISIONS IN 2007, BY FUNDING OPPORTUNITY

GOVERNMENT R&D EXPENDITURE IN 2008



ACADEMY
OF FINLAND

Academy of Finland
Vilhonvuorenkatu 6
POB 99
FI-00501 Helsinki
Finland
www.aka.fi/eng