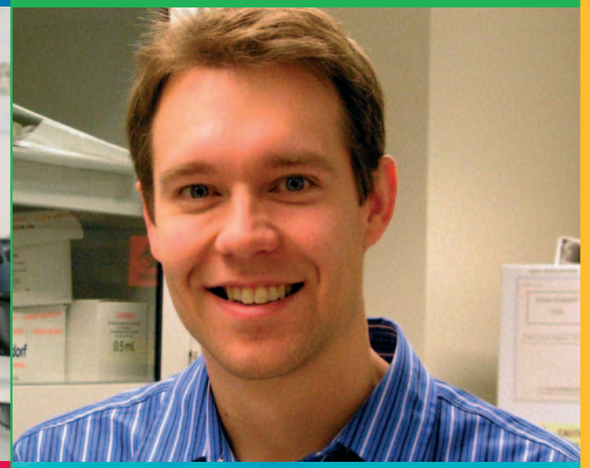
Interested in a career in research?

The Academy of Finland is committed to supporting researchers through the different stages of their career. The Academy provides funding for high-level scientific research, serves as an expert organisation in science and science policy, and works to strengthen the position of science and research. The Academy has various funding instruments for purposes of supporting professional careers in research.

Read more at www.aka.fi/eng

Insights into the job of researcher

Real lives in research



Academy of Finland

Research funding and expertise

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Academy of Finland

Research funding and expertise

There is no shortage of work for researchers

There is plenty in the world to explore and research. Work will never end for researchers because ongoing advances in science and changes in the world around mean that new research themes and new perspectives are opening up all the time. Finland currently has a staff of around 75,000 working in research and development, but international competitiveness dictates that R&D investment will need to be stepped up even further – which means an increased demand for even more researchers!

More than one-half of all researchers work in the private business sector, the rest are employed in public sector jobs such as universities and research institutes. Researchers may work on their own or in teams, but the work they do is in every case characterised by both independence and cooperation.

Research is a creative job. It involves much more than just scientific work; researchers can work in a variety of different kinds of jobs. Researchers at universities give lectures and have teaching duties in addition to their own research work. More advanced researchers have charge of various projects, they supervise the studies of junior colleagues and they have of host administrative responsibilities.

International exchange and cooperation has become an increasingly prominent part of the researcher's job description over the past decades. New technology has paved the way to virtual cooperation, which in turn has led to the proliferation of multinational research projects. Furthermore, many researchers spend periods of time abroad either through researcher exchange programme or as visiting researchers. In academia today, international cooperation is an important tool in the production and acquisition of new research knowledge.

The Academy of Finland supports researchers through different stages of their careers. This brochure introduces eight researchers who represent very different kinds of disciplines. Some of them are only just starting out on their careers, others are well established scholars with a solid reputation both at home and internationally. All, however, share the same ambition of explaining and improving the world and finding new solutions to problems. What about you? Why not consider a career in research?

A career in research

A CAREER IN RESEARCH is much like any other career. The job of researcher is creative and goal-oriented, it promotes and requires personal growth and progress, it involves frequent international contact – and much more besides.

AS FOR ANY OTHER CAREER, you will need to study in order to make a career in research. Researcher training provides a firm foundation not only for a job in academic research, but for many other positions in society and in business and industry. The Academy of Finland supports researcher-students and researchers at different stages of their career. Supporting professional careers in research and inspiring young people to consider a career in science and research are key functions for the Academy of Finland.

THE DEMAND FOR PROFESSIONAL RESEARCHERS is set to increase in the future. It makes sense to embark on a career in research at a young age. Women researchers in particular are in increasing demand.

IN THIS BROCHURE eight researchers and would-be researchers talk about their own careers in different fields of study and in different sectors, both at universities, research institutes and in business and industry.

Researcher's mobility portal http://europa.eu.int/eracareers and www.aka.fi/eracareers

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Biology student hooked on carrion beetles

– For some reason there were people who thought carrion beetles were revolting creatures; young biology student Mikko Pentinsaari cannot understand why.

Mikko Pentinsaari, a first-year biology student at the University of Oulu, was awarded fourth prize in the Academy's science competition for senior secondary school students (Viksu) in 2002. Ever since he was a small boy, he has taken a keen interest in nature and wildlife; insects struck him as particularly interesting, even while he was in the lower grades of school. At senior secondary school, he took part in a University of Oulu project concerned with the determination of beetles. However, it was in the Viksu competition that he really got to grips with doing science.

– The inspiration came from my secondary school biology teacher Antti Rönkä, who early on told us about the competition and encouraged us to think of a subject. I happened to read a couple of articles on the habitat choice of beetles that live in manure, and I wondered whether anyone had ever done similar research with carrion beetles. I began to study the databases but couldn't find a single article on the subject.

The young man's fascination grew ever more intense. He finalised his research plan in the spring of his second year at senior secondary school and started the fieldwork the following summer.

Nervous moments

– In the early stages I was a bit nervous as to whether the method I had developed for catching carrion beetles would work. My traps were modified on the basis of traps used by butterfly researchers at the zoo, but they had never before been used for catching beetles.

He needn't have been worried: the method worked a treat. Indeed, he caught so many beetles that he didn't have the time to study all the material he collected, but his report focused on the sample from the end of May through to the end of July.

The review and analysis of all the material took much more time than he had expected, and in the end he was pressed for time to get his report completed by the deadline.

Useful supervision

– Without the supervision I received the job would have been much harder than it was. For instance, I'm sure I wouldn't have found the right statistical tests, or known how properly to conduct them.

Pentinsaari insists his research project did not detract from his other schoolwork.

– I wrote the report at home in the evenings and during weekends and every now and then discussed it with the teacher who supervised my project.

He says the encouraging and positive attitude of his parents, friends and teachers was crucial to his success in the Viksu competition.

– For some reason there were people who thought carrion beetles were revolting creatures.

Great personal benefit

Pentinsaari says he learned a great deal from the science competition.

– I believe I now have a much better understanding of how research is done in practice: how experiments are designed, how statistical data are processed and in general how to write up the research results. It was all quite fascinating, and it swept me along.

– I had no expectations of any great success because it was quite a struggle for me to meet the deadline. It could have been a more in-depth piece of work. Coming fourth was a pleasant surprise for me.

Now in his first year at university, he is pleased with how everything has turned out.

– I'm studying what I've always wanted to study. In your first year you can hardly talk about doing research, but perhaps the Viksu project will still prove a useful experience for me in the future.

Pentinsaari's interests in the field of biology more generally lie in systematics and taxonomy and to some extent in evolutionary biology. Speciation and the classification of organisms are fascinating areas, both the theory and the practice.

– My studies have gone really well. I'm also working part-time in order to earn some extra income. I can't really say very much about what kind of work I will end up doing, but the idea of research in systematics does appeal to me. I'm sure I'll be a researcher one day, perhaps in a museum job. I'm not too keen on the idea of teaching, he says.

Insects continue to take up a large part of his leisure time, especially in the summer.

– I spend a lot of time studying different kinds of bugs in the winter as well. I try to keep up to date by reading the entomological journals we get at the university library. I also read a lot of literature in this field, either books I borrow from the library or sometimes books I buy. The e-mail lists of beetle aficionados are another important source, and I can also learn a lot of interesting new stuff about domestic species in discussions with other enthusiasts and researchers, the young biologist explains.

Mikko Pentinsaari

Fourth prize in the Academy science competition for senior secondary students in 2002, biology student

- *1984 born in Oulu, Finland*
- *2003 matriculation examination at Oulu Lyceum*
- *2003–2004 military service*
- *2004– biology student at the University of Oulu*

Who's the cleverest of them all?

Since 1998, the Academy of Finland has hosted an annual science competition for senior secondary school students (Viksu). Entries in the form of essays are invited on any subject taught at senior secondary school. In recent years the competition has gained hugely in popularity, with dozens of entries received from all disciplines. Competition entries may be submitted on an individual, team or group basis.

By participating in the competition, students gain a clearer understanding of what exactly goes into a scientific essay or project. The purpose of the competition is to inspire greater interest in a career in research.

The Academy of Finland picks out the best entries and hands out prize money worth a total of 17,000 euros. In addition, 8,000 euros is awarded to the best-performing schools in the competition and to the teachers who have been the most successful in encouraging their students.

What are the hallmarks of a successful competition entry? It searches for new information, it takes an analytic view on its subject-matter and even offers criticisms. The best essays clearly and concisely define and demarcate their subject, and the author focuses closely on the research questions set out. Winning entries will show that the author has the skills and competencies needed independently to design and carry out a research project.

Success in the Viksu competition also smoothes the road to further studies in that many universities automatically enrol students ranking among the top ten performers in the competition, without them having to sit entrance exams.

Read more at www.aka.fi/viksu

Not long to go to the doctorate

– The hardest part of research is not how to resolve problems but how to define them, says doctoral student Avadora Dumitrescu.

Romanian-born Avadora Dumitrescu is currently researching her doctoral thesis in the field of information technology at the Graduate School in Electronics, Telecommunications and Automation (GETA). She started the project in 2000 at Tampere University of Technology, had one year away on maternity leave and is now looking to defend her thesis in 2005.

Dumitrescu's thesis is about the quality of Internet service. With the growing use of the Internet for purposes of data transfer, it is crucial that the standard of online services is high enough so that all new applications work properly. The key is that exactly the right amount of bandwidth is available for the right application in the right time frame.

Eight years in Finland

Dumitrescu moved to Finland and Tampere in 1997 together with her husband, who had received a CIMO grant for his research work in optoelectronics. They knew nothing about their new home town, but it was a very pleasant surprise.

– It is really nice to have nature like this at your doorstep. The winters are long and dark, but I'm sure I would miss the snow and the crisp cold days of winter if they were now taken away from me.

Dumitrescu's impression of people in Finland is that they are direct and honest.

– Everyone's very helpful, even though it's not very easy to make friends here. Social life is much livelier in the Latin culture that my husband and I have inherited; there is always lots going on, lots of friends and family members. One of the things we appreciate in Finland is its security.

Researcher couple share everyday chores

Avadora Dumitrescu and her husband have learned much more about everyday life in Finland now that their four-year-old daughter Ada has started going to day care and joined in other activities. Ada's Finnish is better than her Romanian, which she speaks at home.

The fact that their daughter is integrating so well into Finland is also affecting the family's future plans. They would like to stay in Finland. Once she has earned her doctorate, Dumitrescu is determined to build up her career in a job that will offer fresh challenges and provide a longer-term anchor point.

Given the pressures of research schedules and deadlines, it is not always easy to reconcile the duties of career and family. However, in this family both husband and wife know what each others' jobs require and demand, and they flexibly share responsibility for childcare and daily chores. The only time they will have problems is when both are working to the same deadline. Dumitrescu is full of praise for the Finnish day care system, which allows mothers to concentrate full-time on their jobs in the knowledge that their child is being looked after in a place they like by reliable people who have the child's best interests at heart.

In pursuit of practical applications

University education differs somewhat between Finland and Romania, Dumitrescu says:

– In Romania all academic studies are profoundly theoretical, whereas in Finland there is a much stronger practical orientation, which means the student is better equipped for the 'real thing'. Furthermore, the timetable for university studies in Romania is very strict; in Finland there is more flexibility in this regard, and the courses offered are renewed more frequently. Student life in general tends to be more active here.

Freedom, for Dumitrescu, is at once the best side and the most demanding aspect of her job. As long as the subject promises interesting results, she has the freedom to choose what she wants to research, but there is no one there to make sure she chooses the right path – all she can get from her supervisor are general guidelines and pointers.

– The difficulty is that you first have to define the problems that you want to tackle and resolve, she explains.

Dumitrescu very much appreciates the support she and her fellow students receive through GETA graduate school, the endless research opportunities it offers as well as its interesting courses and seminars.

In the future she expects to have the opportunity to put her research results into practice. Sometimes, when the going gets really tough, she wonders whether she would not prefer a job with more clearly defined problems and assignments. In the end, however, she suspects she would soon be bored without the challenges and even the occasional uncertainty that come with the research job.

Avadora Dumitrescu
PhD student

- *1972 born in Cluj-Napoca, Romania*
- *1991 matriculation examination at Liceul Andrei Saguna, Brasov*
- *1996 MSc (telecommunications) from the University Politehnica of Bucharest*
- *2000– Graduate School in Electronics, Telecommunications and Automation at Tampere University of Technology*

Doctoral degree from a graduate school

Graduate schools are PhD programmes that are open for application to students who have completed their Master's degree at university. Selected by the Ministry of Education, the first graduate schools opened in 1995. Today, there are 114 graduate schools in virtually all disciplines in Finland. Most of them are run jointly by several different universities. Graduate schools now account for a growing proportion of postgraduate studies aimed at the PhD level.

Graduate schools have more than 4,000 doctoral students, 1,400 of whom have full-time student places with four-year funding from the Ministry of Education. Other graduate school students get the funding they need from various sources, for instance by applying to foundations or by working in Academy research projects. Graduate schools select their own students through an open application process.

The Ministry of Education spends almost 40 million euros a year on graduate school students' salaries and on coordination. The Academy of Finland, which plays a key role in the scientific evaluation of graduate school submissions, provides funding for graduate schools in the shape of grants for training courses, internationalisation and the mobility of doctoral students and tutors.

Graduate schools are a highly efficient and systematic route for postgraduate studies. The graduate school system has greatly enhanced the effectiveness of researcher training and raised the standards of supervision for doctoral students, which in turn has helped to reduce the amount of time spent on researching and writing doctoral theses and consequently lowered the average age of doctoral graduates. Inspired by this example, universities have also been starting up their own graduate schools in recent years.

Read more at www.aka.fi/eng > Research funding > Forms of funding > Research training

Postdoctoral researchers are also in demand in the business sector

– Even when you're working abroad it's good to keep many irons in the fire back home. Every researcher needs a strong network in various directions, says Jarkko Rautio.

Ask Jarkko Rautio's small children what their father does for a living, and they will tell you that "Daddy makes drugs". Rautio feels he needs to elaborate a bit.

– I have a visiting researcher appointment at the pharmaceuticals company GlaxoSmithKline in the United States. My assignment here is to study the body's transport mechanisms that carry alien substances such as medical drugs into and out of the body. The research is ultimately aimed at improving drug properties, at making them more effective.

That is about as much as Rautio is allowed to talk about his top secret job. Pharmaceuticals are a multi-billion industry. Researchers and product developers in this field are prime targets for brainhunters.

Although he is not at liberty to discuss his job in detail, Rautio is more than happy to talk about his career, about how he has come into his current job as visiting researcher, and what he expects of the future.

– I'm not planning to stay in the US but I'm travelling back to the University of Kuopio, Finland, in summer 2005, he says.

Ideal drugs reach their target straightaway

Rautio graduated as Master of Science in Pharmacy from the University of Kuopio Department of Pharmaceutical Chemistry in 1996. He had his first encounter with pro drugs during the three-month laboratory course of his basic studies. A pro drug is a compound in which the inactive therapeutic substance is converted into its active form in the body.

It was in this field of pro drugs that he found an opening for his doctoral studies. He researched his doctoral thesis during 1996–2000 and at the same time had various temporary posts, including those of assistant.

– The target I set for my doctoral thesis was to increase tenfold the skin permeability of a certain medical substance using pro drug technology. As it turned out we achieved a ninefold improvement, which to me was an excellent result.

USA or Finland?

Around the turn of the millennium Rautio spent a year at Maryland University in Baltimore as a postdoctoral researcher. In 2004, he moved to the US again with his family. Prior to this latest move he had already been awarded a postdoctoral fellowship with the Academy of Finland. The term was extended, and it was during his second term that he got this current appointment as visiting researcher with the Drug Metabolism and Pharmacokinetics team at GlaxoSmithKline.

Rautio now has experience from both the academic and the business side of research in the US.

– Here it's the publish or perish principle even in the academic world. Professors are expected to generate income for their host organisation, otherwise they will have to leave. On the other hand, pay levels in the US are higher than in Finland.

The same expectations of productivity apply in Finland, too, but the outputs are weighed from a different vantage-point.

The Finnish and US universities also differ in terms of their research facilities and equipment. According to Rautio, the facilities at Kuopio are of a higher standard than those he saw at American universities.

– The American pharmaceuticals company is a case apart. They will spare no effort in ensuring the researcher can concentrate on his core area of research. There is separate staff who prepare the necessary solutions and supply the reagents and equipment direct to the laboratory.

Rautio feels that both countries have their good sides, but he has chosen to return to Finland during summer 2005. He feels a great affinity with the ambitious research community in Kuopio.

Career continues in Kuopio

When Rautio gets home after work, he puts all thoughts of pharmaceutical chemistry to one side. He says he is very grateful to his wife who has made sacrifices in her own career to look after the family and their three children in a foreign country. When the day's work is done, his four-year-old son and six and two-year-old daughters get his undivided attention.

Rautio's future plans include the supervision of doctoral theses.

– I have kept in touch with three postgraduate students of mine and I'm really looking forward to working more closely with them again.

The next target for him is a docentship. There are lots of young advanced researchers at the University of Kuopio, so it's a challenging scene that he is stepping into.

– It's really with myself that I want to compete. If you set your goals high enough, it is easier to keep up with the pace and retain your competitiveness amongst other people as well.

Rautio says his current research interests would provide enough challenges for the rest of his life. Even so he wants to remain open to new areas of interest.

– To me it's important that researchers take an interest in other subjects that tie in closely with their main area of study. At some stage it might be beneficial to shift that focus.

For the time being, though, Rautio is 100 per cent committed to his current research theme.

Jarkko Rautio
Academy of Finland postdoctoral researcher

- *1971 born in Kuopio, Finland*
- *1990 matriculation examination at Kallavesi senior secondary school*
- *1996 Master of Science in Pharmacy from the University of Kuopio*
- *1998 Assistant at the University of Kuopio*
- *1999 Licentiate of Science in Pharmacy from the University of Kuopio*
- *2000 Doctor of Science in Pharmacy from the University of Kuopio*
- *2000–2001 Postdoctoral researcher, Maryland University, USA*
- *2001–2002 Project Manager and Assistant, University of Kuopio*
- *2002–2006 Academy of Finland postdoctoral researcher*
- *2004–2005 Visiting researcher at GlaxoSmithKline, USA*

Postdoctoral researchers have a varied job

Postdoctoral researchers are recruited from amongst students who have recently earned their doctorate. The purpose of hiring postdoctoral researchers is to support young people in gaining the qualifications and independence they need in the professional research career. Their duties include conducting research according to a set plan, supervising thesis and dissertation writers and teaching at university.

The postdoctoral researcher's is a mobile job as they may be doing research in several different projects. The Academy accordingly has many different forms of funding for supporting newly graduated professional researchers: for instance, they may apply for grants for purposes of working abroad.

Read more at www.aka.fi/eng > Research funding > Forms of funding > Research training

Academy research fellow rocks around the clock

– Globalisation is steamrolling us – or is it? The international success of Värttinä and other Finnish world music bands is a good example that things can also move in the opposite direction, says Academy Research Fellow Yrjö Heinonen.

It is hard to imagine what the Beatles, Elvis and the Seinäjoki Tango Festival in Finland could have in common – apart from the obvious fact that they're all music.

Academy Research Fellow Yrjö Heinonen sees them all as examples of cultural phenomena.

– I find this an intriguing subject and challenge. Just consider what sort of national therapy the tango provided after the war, and how it divided the youth of the sixties.

In cultural policy terms the annual Tango Festival in Seinäjoki is a particularly interesting phenomenon.

– You can keep just about any summer event going for a couple of years, but this has been going on for 20 years now, and that has to count as a phenomenon. It couldn't do that unless it had real substance.

Heinonen is endlessly fascinated by the Finnish tango, a music genre that combines Latin rhythms, Slavonic romance and the German march.

– The tango's a kind of national icon. When you show videos from the Tango Festival at international conferences, for example, people are amazed at the plainness of our culture of stage performance. Music has many faces but it's also faceless.

Work and leisure interests tie together

In the 1960s, Yrjö Heinonen was swept off his feet by the Beatles. At the time he was studying classical guitar, and eventually he went to the University of Jyväskylä to study music science. Now, Heinonen is in his third year as an Academy Research Fellow.

– Your leisure pursuits may well pave the way to a job as a researcher. There are endless possibilities. Music is a key element in movies, for instance, and music videos have also opened up new areas of study. And then there's the power of lyrics. Cultural music studies is the key to our immediate past and national identity, he says.

Heinonen feels it is not at all easy to reconcile work and family life. And in his own case the situation is complicated even further by the fact that his wife, too, has chosen an academic career.

– The researcher's job is one where you're always on the move, and you have deadlines around the corner all the time. Sometimes it can really pile up.

Fortunately, though, music is not just an enthralling research subject but also a great hobby that can be enjoyed back at home. Music has an intense presence in the family's home, everyone enjoys music.

– Exercise, cooking and movies are also the kind of stuff that we enjoy, he says.

Music reflects national identity

Heinonen suggests that the reason why Elvis and the Beatles became such great stories was that the post-war years were marked by intense events – the Cold War and the first steps in space, the civil rights struggle of African Americans, the Vietnam war and the anti-war movement – and they both captured the essence of this spirit.

– Elvis gave a white face to black music and pioneered its emergence on the white stage. The Beatles years, from the time the band was first set up to their last studio recordings, coincide exactly with period from the first Sputnik satellite to the first manned mission to the moon, Heinonen explains.

The breakthrough of cultural music studies, Heinonen argues, happened during the 1990s. There is certainly no shortage of research subjects; possible areas of study include art music, folk music, or popular music.

– The key thing is to mirror the changes in music against the society around.

– And what about when music is used at once for identity building and for commercial purposes? This is another extremely interesting question, Heinonen says.

Yrjö Heinonen
Academy Research Fellow in Music Science

- *1951 born in Lahti, Finland*
- *1962–1980 Lahti Lyceum and classical guitar and music theory studies at Lahti Music Institute, now the Päijät-Häme Conservatory*
- *1983–1985 part-time teacher, substitute assistant, University of Jyväskylä*
- *1987 Master of Arts from the University of Jyväskylä*
- *1987–1989 Assistant, University of Jyväskylä*
- *1989 Licentiate of Philosophy from the University of Jyväskylä*
- *1990 and 1992 researcher on an Academy project in cognitive science research programme*
- *1990 and 1993–1994 substitute Associate Professor in Music Science, University of Jyväskylä*
- *1991–2001 Senior Assistant, cognitive music research, University of Jyväskylä*
- *1995 PhD from the University of Jyväskylä*
- *2002 Researcher, music science, University of Jyväskylä*
- *2002–2007 Academy Research Fellow, University of Jyväskylä*

Academy Fellowships are sought after positions

Successful candidates for Academy Research Fellow posts are expected to have completed their doctorate, published significant contributions in their field and worked in research projects. Academy Research Fellows work within their host organisation, but their salary is paid by the Academy of Finland.

Although Academy Research Fellows often work as team members, they have their own independent research plans. In addition, Academy Research Fellows are expected to do some teaching and to supervise students researching their Master's and doctoral theses.

The Academy Research Fellow's job involves continuous exchange and interaction with the broader research community and internationally networked colleagues. There are at present 247 Academy Research Fellows in different disciplines (situation as at 1 August 2005).

Read more at www.aka.fi/eng > Research funding > Forms of funding > Research posts

The freedoms and responsibilities of research work

Professor Hanna Kokko commutes to work on foot or by bicycle; weather permitting, she even takes her skis. – In the past 18 months I have spotted more than 130 bird species!

What do early migratory birds and people queueing overnight for tickets at a concert have in common? Both are trying to make sure they get the best possible spots, to gain and hold territory for themselves. Neither, however, succeed in these efforts if viewed from a systemic point of view because the struggle for territory is always waged among individuals.

This is one of the examples that Professor Hanna Kokko likes to use when explaining to lay audiences her research interests in evolutionary ecology.

In another example, she dwells on the reasons for the peacock's fantastic tail.

– If the male peacock can show it is capable of surviving in spite of its spectacular plumage, the message it conveys could well be that I have a strong set of genes. And if the female is attracted to that sort of thing, the couple may well have offspring.

– But what is it in these displays that attracts females? That is an intriguing and complex question all in its own right, Kokko says – and goes on to introduce a tool that can help researchers gain a clearer grasp of these two-edged questions.

Mathematics helps to understand

– If you really want to understand how evolution works, it's not enough just to go out and explore nature. Nor is it enough to study cells or genes, she says.

Hanna Kokko uses mathematical simulations to test the logic of arguments.

– People do not quite realize how much analysis and mathematics goes into this. Mathematics will give you more accurate conclusions than debates and discussions down at the pub – even though that can be good fun as well!

Kokko says she has been interested in birds, astronomy and mathematics ever since she was a small girl.

– But I didn't really know what I wanted to study even when I was at senior secondary school. I was drawn to biology and physics, but somehow biology seemed too 'soft' to me, so I decided to go to Helsinki University of Technology to study physics.

In her diploma thesis in 1995, she combined two of her pet interests: her work dealt with the protection of the population of Saimaa seals from a mathematical point of view.

– This project brought it home to me how wrong I had been in assuming that biology was somehow a softer science. Ecology at least has a firm grounding in mathematics, Kokko adds.

– This led to my moving to the university and eventually to my dissertation thesis on animal mate selection.

Everyone in the team is following the spectacle of evolution

Hanna Kokko is currently interested in studying equations of territory formation. Her four years of research into the behaviour of 'equation creatures' is now beginning to produce solutions.

Following her Academy Fellowship Kokko was appointed Professor of Evolutionary Ecology at the University of Helsinki.

With her appointment to a professorship in 2004, Kokko has taken charge of a team whose members all share the same passion for research.

– I have three postgraduate students and one post doc researcher, soon a second under my supervision. Only one of them is Finnish, she says.

Running a research team adds a whole new flavour to the job. In a sense this, too, is about marking out territories.

– The researchers on my team are all friends of mine, but I must be able to give them the supervision they need and to steer them in the right direction if I think they are going astray in their research.

Kokko receives a grant from the Academy of Finland for purposes of hiring research staff, which directly impacts the size of her research team.

Exchanging information with students and colleagues

Apart from her own research work and the supervision of her team, Kokko's duties in her five-year professorship include various international responsibilities such as memberships of editorials boards and scientific organisations as well as the revision of doctoral theses.

While on a lecture tour in Australia, Professor Kokko gets to meet her colleagues with whom she is now working on a new textbook:

– The interaction I have with students is rather different from the interaction I have with colleagues who are at the same stage of their careers as I am. People who are younger than I know a lot of stuff that I don't. I have a postgraduate student, for instance, who is absolutely brilliant out in fieldwork; I myself am more of a theorist. The research team is a great mix of people who complement one another. Colleagues, on the other hand, are a peer group with whom we work to define and demarcate our research subject.

Hanna Kokko
Professor of Evolutionary Ecology

- *1971 born in Helsinki, Finland*
- *1990 matriculation examination at the German School of Helsinki*
- *1995 Master of Science in Technology from the Helsinki University of Technology*
- *1997 PhD from the University of Helsinki*
- *1997–1998 Academy of Finland postdoctoral researcher*
- *1998–2000 Academy of Finland postdoctoral researcher and postdoctoral researcher at the University of Cambridge, UK*
- *2000–2002 Postdoctoral researcher at the University of Glasgow, UK*
- *2002–2003 Senior Assistant, University of Jyväskylä*
- *2003–2004 Academy Research Fellow*
- *2004– Professor of Evolutionary Ecology, University of Helsinki*

Research environments are many and varied

Research is often funded by monies obtained from different sources. Usually the host university or research institute will provide the basic facilities, but it is only rarely that they cover all the costs. Other important sources of funding apart from the Academy of Finland include the National Technology Agency Tekes, ministries, the European Union and other international organisations.

Research environments are slightly different from one another in different disciplines. In the natural sciences, medicine, engineering and some other fields most research is done on a team basis, in the humanities and social sciences this is less typical. Nonetheless, even in these fields there is now more and more networking among researchers.

Read more at www.aka.fi/eng > Research funding
www.tekes.fi/eng, www.cordis.lu/en/home.html

Research professor takes a professional approach to research

– We live in a world where the need for social sciences and social scientific analysis has only increased, says Research Professor Sakari Hänninen.

Art history, mathematics, architecture... a whole host of interests and a set of school grades that were good enough to gain automatic entry to any of a number of faculties. However, Sakari Hänninen spent some time working on a cargo ship before deciding in favour of the social sciences.

– I graduated in eighteen months and I had already signed up for maths when I was offered a position as assistant at the Department of Political Science, Hänninen says. This was the decisive moment that determined the future course of his career.

– It was an exciting period of time. Political science in the 1970s was calling into question established paradigms, challenging older views and tenets.

Politics is about seizing the opportunity

How is politics possible? And what can politics do to help the most underprivileged groups in our society? These questions provide perhaps the most accurate summary of the current interests of Research Professor Sakari Hänninen in the field of welfare policy.

– If one were to define politics in some way, you could say it is about seizing the opportunity: a strategic ability to read situations. This is at once what makes it so hard to define politics in advance.

He insists that politics does not create systems to which people have to adapt, but rather it is a tool for changing situations and circumstances. The red thread that runs through all his work is to try and find out what can be achieved by means of politics.

Hänninen refers to studies of social deprivation and marginalisation where there is a tendency to conclude that all non-voters, for instance, are apolitical. Matters concerning these people are usually addressed by various technical means.

– The thinking is that our job is just to activate, educate, and empower these people.

He does not want to stand up as an advocate for these people. The professional researcher's job, he says, is to work within his own forum, in the scientific research community.

– One of the greatest challenges for the researcher is to create space so that the voice of the socially most underprivileged groups can be heard. If you want to change things, you absolutely have to do that through your research and research results. This may well be described as the politicisation of things and situations, but it must not mean that you take on the role of an advocate for a certain group.

From research institute to university – and back again

During his career Hänninen has worked both at government research institutes and at university. He compares the two from the vantage-point of his current position as Research Professor:

– University professors have a much wider job description: apart from research, the job involves teaching as well as supervisory duties. On the other hand, the university professor often gets to concentrate on very closely defined research problems in his work.

The situation is quite the opposite at a government research institute: the job description is more closely defined, but the research covers more far ranging issues.

He says he had no difficulty making the move, largely by virtue of his close contacts and networks. He had collaboration with researchers at the Research and Development Centre for Welfare and Health (Stakes), while at the University of Jyväskylä, and now that he himself has moved to Stakes he is in constant touch with people at different universities.

– A change of employer is a breath of fresh air. It forces you to reconsider and reassess your own views, he says.

Determined and independent work

Hänninen considers his job a vocation. It is a passionate dedication, a constant search for answers.

– But this kind of job does require analytical reflection which is only possible in a situation where you have complete autonomy and independence, he adds.

He is keen to stress that the autonomy of scientific institutions and university cannot be overemphasised. It is particularly important in situations where the interests of various background institutions have a tendency to determine research practices.

Hänninen compares the researcher to the artist and points out that no one would think of trying to prevent artists from carrying out their vocation by insisting that they contribute to the effort of increasing national productivity.

– We live in a world where the need for social sciences and social scientific analysis has only increased, he observes. In this light, he continues, it is peculiar that the Finnish school curriculum does not include the subject of social studies.

– When I spent a year as an exchange student in the US in the 1960s, one of the subjects at high school was 'social problems'.

He wants to encourage young people to consider a career in research, in spite of the general impression that there is no use for scholarship and that employers are not interested in hiring PhDs.

– I do this in spite of the fact that the high-quality requirements in the job would certainly warrant much better pay. The researcher's job requires great determination, but the results of that determination are rewarding in many ways.

Sakari Hänninen
Research Professor

- *1948 born in Pieksämäki, Finland*
- *1968 matriculation examination at Kallio coeducational school in Helsinki*
- *1970 Master of Social Science from the University of Helsinki*
- *1971–1983 Assistant, substitute Associate Professor, University of Helsinki*
- *1976 Licentiate of Social Science from the University of Helsinki*
- *1983 Doctor of Social Science from the University of Helsinki*
- *1984–1988 Academy of Finland Junior Fellow*
- *1989–1992 Academy of Finland Senior Fellow*
- *1992–1995 Senior researcher, National Board of Social Welfare and Health*
- *1995–1998 Associate Professor of Political Science, University of Jyväskylä*
- *1998–2003 Professor of Political Science, University of Jyväskylä*
- *2003– Research Professor, National Research and Development Centre for Welfare and Health, Stakes*

Helping public administration make more informed decisions

Professional researchers are in demand not just in the world of science and research. Large numbers of researchers are doing a valuable job in what is known as sectoral research, i.e. broadly based background inquiries aimed at reinforcing the knowledge base in society. Sectoral research provides a more solid foundation for decision-making by ministries and their respective administrative branches and for the development of society more generally.

Government research institutes are one of the key sites of sectoral research. The institutes decide on their core areas of research, although most of their operation is funded from outside sources.

The professor whose only research tools are paper and pencil – and lots of time

– There are plenty of interesting jobs for cryptology experts in the business sector, but even on a global scale the number of vacancies is limited, in Finland there are just a handful, says Professor Kaisa Nyberg.

Many myths surround the science of cryptology, the main area of specialisation for Professor Kaisa Nyberg. For ordinary people who like to watch movies, cryptology is about breaking top secret codes: the job of a genius trying to outwit evil criminals. Nyberg wants to put these myths to rest.

– The chief aim of cryptology is to improve data security and by the same token people's privacy. In practice what we do is develop encryption techniques, identify data security loopholes and define methods.

The job requires the capability of mathematical and logical thinking, but in principle it can be done simply by means of paper and pencil.

– Encryption techniques are more clearly defined, and therefore they provide perhaps an easier development target than data security systems in general. But just as it is difficult to develop and build a security system that is 100 per cent safe, so encryption technology has its own pitfalls.

Jobs with the Armed Forces and Nokia

Kaisa Nyberg has worked for long periods in both the business sector and public administration. She is a pure mathematician who has had a significant research career in the academic world, although she has also had jobs with the Finnish Armed Forces and most recently with Nokia Research Center.

– In 1987, I left the university and was appointed senior researcher at Defence Staff. My job was to develop the security of communication systems for national defence purposes.

She enjoyed her job – brainwork required intense concentration, there was no hurry and there were always surprises around the corner.

In 1998, Nyberg took up the post of Principal Scientist at Nokia Research Center. Here, she learned what it is like to do research in a major business corporation.

– Data encryption techniques are paramount to the security of mobile phones and mobile phone networks. More recently, encryptions techniques have also been used for purposes of securing services provided over mobile phone networks. At Nokia, new ideas are thrashed out in a team effort.

Nyberg was appointed Professor of Information Processing at the Helsinki University of Technology as from the beginning of 2005. However, she also continues to remain Research Fellow with Nokia.

Framework required for a new field of study

– It is a very small group of people who are working in Finland to develop cryptology as part of computer science. The professorship I have been awarded means I will be working with my research team to develop a new theoretical framework for this aspect of the discipline. We will be researching security models that anticipate the intentions of people attacking systems from the outside. Secondly, we are interested in the very smallest components of the encryption system, cryptographic primitives. Our third challenge is how to put all this research evidence to practical use in real-world security applications.

Nyberg has enjoyed good success in her job but says modestly that she is no lightning-fast genius, but she has tenacity and insight.

Ethical issues abound

Kaisa Nyberg says it is good to see that research results in the field of cryptology are published openly.

– In the early days we used to have a lot of debate on whether or not it was morally the right thing to do to publish information about the loopholes and shortcomings of encryption technology – after all this information can easily be misused. However, openness and transparency is the foundation of all science.

Nyberg is convinced the experience she has gained in the private business sector will serve her in good stead in the world of science. The development of one product requires results and inputs from many different disciplines.

Reflecting on her life, Nyberg is keen to stress that work is not the only important thing. Together with her family, very much as a counterbalance to her intellectual work, she has built a summer home in the Gulf of Finland archipelago. Kaisa Nyberg and her ambassador husband have three children.

Set up a family whenever you want to

Nyberg has never allowed any tut-tutting quench her ambitions and career plans.

– Setting up a family does not in any way interfere with a career in research. In my student days there weren't any comprehensive funding schemes that would have made everyday life easier for young mothers. I was 27, 29 and 35 when I had our children, and it was between the second and third child that I completed my doctoral thesis.

– It's true that there have been spells in my life when the family and work have taken up all my time. But I now find that I have plenty of time to spare for other things as well.

One of these things is the family summer home, which is just about as huge a project as Nyberg's research subject – but out in the archipelago she does not need her paper and pencil as much.

Kaisa Nyberg

Professor of Information Processing and Research Fellow

- *1948 born in Oulu, Finland*
- *1966 matriculation examination at Tapiola coeducational school*
- *1971 Master of Science from the University of Helsinki*
- *1982 PhD from the University of Helsinki*
- *1982–1983 Teaching and research assistant at Cornell University, USA*
- *1971–1989 Research assistant and lecturer, University of Helsinki*
- *1986 Docent of Mathematics, University of Helsinki*
- *1987–1991 Senior researcher in cryptology, Defence Staff*
- *1991–1995 Researcher, grant from the Scientific Advisory Board for Defence*
- *1992 Visiting researcher at the University of Karlsruhe, Germany*
- *1993 Visiting Professor at the Technical University of Vienna, Austria*
- *1995–1998 Senior researcher, Finnish Armed Forces*
- *1997–2004 Docent of Cryptology, Helsinki University of Technology*
- *1998–2000 Principal Scientist, Nokia Research Center*
- *2000– Research Fellow, Nokia Research Center*
- *2001–2003 Member of the Research Council for Natural Sciences and Engineering, Academy of Finland*
- *2005– Professor of Information Processing, Helsinki University of Technology*

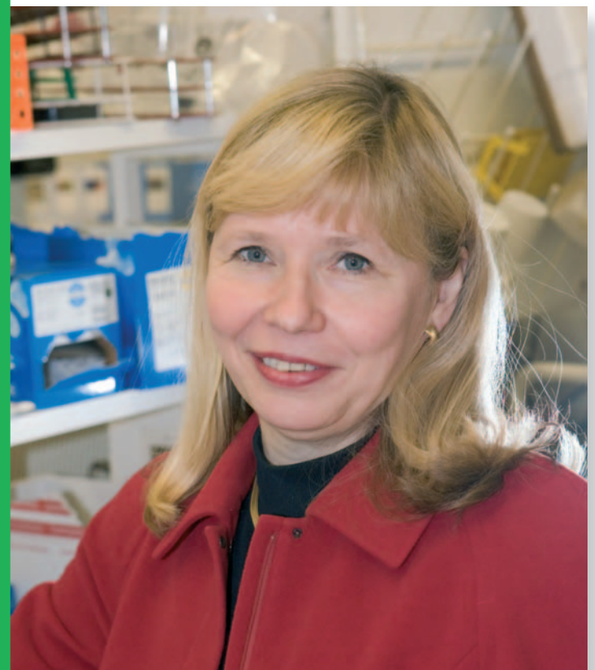
Research environments are working more closely with one another

As industry and academia continue to step up their cooperation, the boundaries between different research and innovation systems have become more and more flexible. A PhD graduate can now find an interesting job either at a business R&D unit or at a government research institute.

In today's increasingly diverse field of research cooperation, even professional researchers can make career moves that take them from one job environment to another. The presence in the workforce of PhDs helps to strengthen the international credibility of business companies and brings improved expertise in research methods.

Read more: Publications of the Academy of Finland 7/05: Sustainable and Dynamic Partnership. Research Cooperation and Researcher Training between Universities, Research Institutes and Business and Industry. The report is also available online at www.aka.fi/Publications > Publications series

At the helm of a centre of excellence in research



– We are keen to work closely with business companies as well. Building and maintaining contacts and networks is an integral part of this job, says Academy Professor Sirpa Jalkanen.

Academy Professor Sirpa Jalkanen concedes she is a 'late-born researcher'.

– I might well have remained in the medical profession, but when we had small three children and my husband was doing his military service I was unable to work evenings, nights and weekends at the clinic, so I applied for a job as a researcher.

The young Licentiate of Medicine was also eager to try her wings in the science and research community. She got a post at the University of Turku Department of Medical Microbiology and started researching her doctoral thesis. Today, with three grown-up children, Jalkanen has charge of the Cell Trafficking Centre of Excellence at MediCity, the University of Turku Research Laboratory.

Mentor in the United States

Sirpa Jalkanen is one of those researchers whose specialisation is a series of coincidences.

– When I was finalising my doctoral thesis in 1983, my husband's job took us to the United States for three years. I sent out applications for a position as post doc researcher to six different laboratories. I soon had a phone call from a young professor who wanted me to join his team. He was from none of the six laboratories I had contacted, but Eugene Butcher came to have a very significant influence on my career.

Jalkanen uses the tools of immunological and microbiological research to find ways of curing cancer and inflammatory diseases such as rheumatoid arthritis, psoriasis and diabetes.

– How can we prevent the spread of cancer? How can we develop more effective cures for inflammatory diseases? These are the kinds of questions we are trying to answer, she says.

After her three years in the United States, Jalkanen moved back to the University of Turku.

– In those days the pay system we had at the Department – which made it possible for me to work abroad in the first place – required that I return to the university. Not that I didn't want to, the research community here in Finland was excellent.

She is pleased to see that the Academy now has the resources to support young researchers on a completely different scale than was the case in her youth.

– When I returned from the United States in 1986, it took me three years to get an appointment as Junior Fellow with the Academy of Finland. Today, promising young talents do not have to suffer such long waits, but they can carry on with their research careers straightaway.

Researchers could do with management training

Sirpa Jalkanen has experience both of working on her own and working in teams.

– When I was abroad, I learned that you have to work hard to earn your own place.

The most rewarding moment in her career so far has been her appointment as Academy Professor in 1996. A researcher who applies for the post of Academy Professor will already be well established in the research community. For this reason, the selection process involves no interviews – at this stage it's the written results that count.

– In my current position as Academy Professor I have charge of a centre of excellence where we have a research staff of around 25. I've never had any management training, but I feel that anyone who runs scientific research teams or programmes has to be fair and has to work hard.

Brainstorming – the best part of the job

Target outcomes, marketing one's own work, reviewing applications for research grants, and heavy reporting requirements are all familiar to Sirpa Jalkanen. It's important not to let all this get the upper hand: they're an important part of the professor's job and and crucial to ensuring the continuity of the research project.

– The fact that our group has been appointed an Academy of Finland centre of excellence is vital to research that is so detailed as ours and that is conducted on this sort of scale, she says.

Every now and then, Jalkanen still finds the time to make her way down to the laboratory. What she enjoys most of all are the brainstorming sessions with her researcher colleagues.

– Our researchers are so experienced and creative that they're coming up with new ideas all the time.

Research subjects should be fresh

Every researcher is driven forward by significant results. Based on the findings of Jalkanen's research team, the pharmaceuticals industry is working to develop new treatments for inflammations.

– We have seen a number of major breakthroughs in recent years in the treatment of rheumatoid arthritis and MS disease, for example, Jalkanen points out.

The research team are currently working to define a new line of research. If the project gets off the ground, the team will begin studies into how bacteria change the body's defence mechanism.

– There is a great sense of ambition and thirst for knowledge at the centre of excellence, she says.

Sirpa Jalkanen

Professor of Immunology and Academy Professor

- *1954 born in Jyväskylä, Finland*
- *1973 matriculation examination at Jyväskylä Lyceum*
- *1979 Licentiate of Medicine from the University of Turku*
- *1983 Doctor of Medicine from the University of Turku*
- *1983–1986 Postdoctoral researcher at Stanford University, USA*
- *1989–1991 Academy of Finland Junior Fellow*
- *1991–1994 Academy of Finland Senior Fellow*
- *1996– Academy Professor*
- *1997–2001 Professor of Immunology, University of Helsinki*
- *2001– Professor of Immunology, University of Turku*

Academy Professors are at the pinnacle of their careers

The position of Academy Professor is the highest Academy-funded research post. Persons awarded an Academy Professorship are all established, top-level researchers who have a major influence on the development of science and research in their field and who enjoy wide international recognition.

In addition to doing their own research, Academy Professors have responsibility for the supervision of their research teams as well as the work of junior researchers, and they often have teaching duties at university. In 2005, the Academy has a total of 39 posts for Academy Professor.

High-level research competencies are also required of the persons in charge of centres of excellence in research. The Academy's centre of excellence programmes are designed to promote the development of creative research environments. Centres of excellence are at the international cutting edge of research in their respective fields.

Read more at www.aka.fi/eng > Research funding > Established researchers