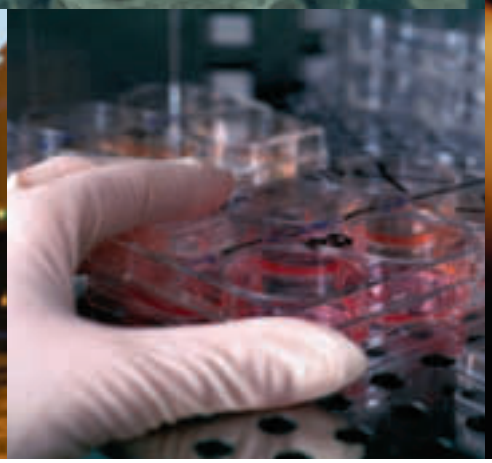


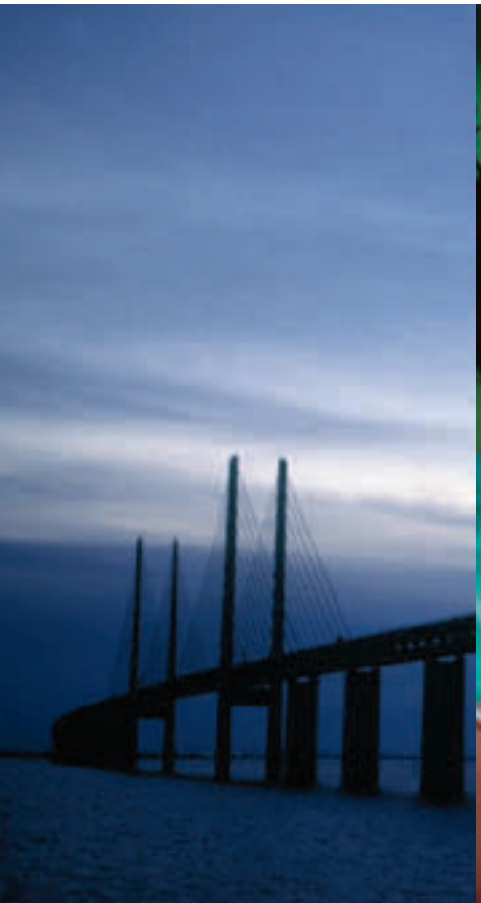




Vetenskapsrådet

SWEDISH RESEARCH COUNCIL

REVIEW OF THE YEAR 2006-2007





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A WORD FROM THE DIRECTOR GENERAL

PHOTO: TORBJÖRN ZADIG

It is a pleasure to invite you to learn more about science in Sweden. In this magazine, we present recent discussions and some new and interesting research. Let me first remind you that this is a special year for Swedish science: in 2007, we are celebrating the Linnaeus Tercentenary to commemorate the birth of Carl Linnaeus in 1707.

The Swedish Research Council is comparatively very youthful. It was formed in 2001 and replaced five specialist research councils. Active researchers form a majority on the Board, but our first Board Chair came from the political sphere. I like to think of this as a way of building trust between researchers and politicians. Our second Chair Björn von Sydow, the former Speaker of the Riksdag (Swedish Parliament), is following in the political tradition. One article in the magazine describes efforts to build a meeting-place for researchers and MPs. There is also an interview with Lars Leijonborg, Minister for Education and Research. He has, for instance, managed to convince the Cabinet that Sweden should offer to host the European Spallation Source. Isn't that, surely, a vote of confidence in research?

Let me now mention two recent achievements presented in the following pages. One is *The Swedish Research Council's Guide to Infrastructure* and the other is the first round of Linnaeus support (the 'Linnaeus Grant') for higher education institutions (HEIs). Both are examples of activities that are having an impact on the structure of the Swedish research system.

The Guide is an example of self-organisation, with researchers from all fields providing their input on the necessity of infrastructure for future research. The first version also served as an inspiration for academic disciplines that have not discussed infrastructure to date.

The Council's Linnaeus Grant, on the other hand, fulfils an assignment from the Swedish Government. For the first time HEIs, rather than individual researchers, are the applicants for Council support. The Grant will give the successful HEIs stable funding, lasting up to ten years, for a specified research environment. The first application round has already exerted an impact on discussions at the local level, and several HEIs have made special efforts to develop their prioritisation processes.

My understanding has always been that competition and cooperation go hand in hand. Today, competition is global and anyone wishing to stay competitive cannot find partners on a national basis alone. The Council has therefore funded three Centres of Gender Excellence to boost both international competitiveness and Sweden's attractiveness in terms of collaboration.

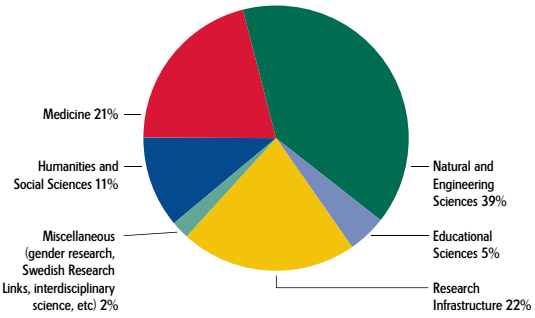
Everywhere, there seem to be problems associated with research misconduct. Science evidently needs both gatekeepers and caretakers. In Sweden, we are currently discussing a new national body to investigate this misconduct. Taking good care of young researchers is also imperative. We are providing more support for postdoctoral positions both in Sweden and abroad, as well as support for people in later stages of their careers, with a view to enhancing opportunities for recurrent peer reviews in science careers.

Finally, I would like to point to one article in the magazine that inspired a great deal of thought. It concerns research on the effects of teaching philosophy in Years 4 and 5 of compulsory school. The results were surprising and slightly alarming. Might critical thinking really be in danger? I couldn't resist posing questions, and curiosity seized me. Wonderful! ✱

Pär Omling
Director General
Swedish Research Council

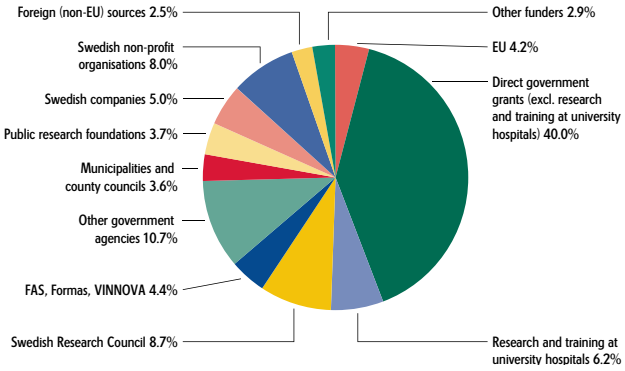
Funding by the Swedish Research Council in 2006

(Sum total: SEK 2,749 Million / EUR 291 Million)



Income for research and graduate education at higher education institutions in 2006

(Sum total: SEK 24,900 Million / EUR 2,640 Million)



THREE MAIN AREAS OF RESPONSIBILITY:

RESEARCH FUNDING, RESEARCH POLICY AND RESEARCH COMMUNICATION

Research funding

The Swedish Research Council allocates support for Swedish basic research of the highest quality, with an emphasis on bringing about development and renewal. Our policy is to direct resources to the highest-quality research grant applications. These projects are either in the front line of already established fields, projects in emerging fields, or cross-disciplinary projects that contribute significantly to basic research. Most grants from the Swedish Research Council are awarded to individual researchers or research groups for projects within Natural Science, Medicine, Engineering Sciences, Social Science, Educational Sciences and Arts and Humanities. The Swedish Research Council also funds the academic positions of more than 300 scientists at universities. Applications for funding are received in an annual open call and are evaluated through a peer review process.

Research policy

The Swedish Research Council is an advisor to the Government in matters relating to research policy. It produces analysis reports on different issues regarding to research policy. It is also engaged in strategic issues concerning research and research funding in a national and international perspective. The Swedish Research Council has an overarching responsibility to ensure that attention is paid to ethical issues in research. The Council also works for enhanced gender equality in the research community and promotes the adoption of a gender perspective in research contexts.

Research communication

The Swedish Research Council has a Government mandate — in cooperation with higher education institutions, other funding providers and the researchers themselves — to create meeting places for researchers and others in society. It also develops new methods for disseminating popular science, and bring controversial research issues to the fore. Research information is no longer a question of one-way provision of information, but rather collaboration and dialogue — communication.

The Swedish Research Council works on research communication in order to increase trust and legitimacy, safeguard research funding and recruitment of future researchers and to improve research through increased collaboration. The most important purpose of research communication is to promote democracy and growth. *

FIVE YEARS OF FIVE COUNCILS IN ONE

BY MICHAEL LÖVTRUP

The Swedish Research Council celebrated its fifth anniversary on 1 January 2006. The amalgamation of the five former research councils was part of a comprehensive reorganisation of the Swedish system of research funding. The aim was to be better equipped to meet present-day requirements. Here, some of the key people behind the formation of the Swedish Research Council express their views on the Council's first five years.

The most extensive restructuring of Swedish research funding for decades was hardly the work of a few individuals. However, few were able to follow the process at such close quarters as Hans Wigzell, Agneta Bladh and Madelene Sandström. Hans Wigzell, then President of Karolinska Institutet, headed the commission of inquiry that proposed the new structure.

Agneta Bladh was the state secretary under the then Minister for Education and Science, Thomas Östros, while the government bill was written and piloted through the Riksdag (Swedish Parliament). Madelene Sandström was the secretary in the committee whose task it was, in the course of a few months in autumn 2000, to prepare the new Swedish Research Council's launch on 1 January 2001.

Hans Wigzell was assigned by the Government to head a working group with the task of proposing a reformed funding structure for Swedish research in spring 1999. At that point, the issue had already been mulled over for years, without any progress being made. The reports issued by a couple of previous commissions had, after harsh criticism, gone straight into the archive. Nonetheless, according to Mr Wigzell there was widespread agreement that something needed to be done.

"Sweden's research funding was too fragmented. There were a range of agencies commissioning research without having the competence to evaluate it."

Other challenges were globalisation, which spelt stiffer competition from other countries, and technological development, which called for ever greater investments in infrastructure. As Mr Wigzell points out, there was a marked need to be able to implement concerted efforts 'in a skilful way'.

Another reason was that the Swedish Government saw a need for a stronger body on the funding side.

"There was no one who could supply the Government with analyses and documentation for research policy. The research councils' secretariats were small and lacked resources, and it was difficult for them to provide a comprehensive view," says Agneta Bladh.

From eleven to four

In November 1999, the working group presented its proposal. Its hub was the recommendation that 11 old funding agencies should be superseded by three new research councils and an innovation agency. The three councils eventually became the Swedish Research Council, the Swedish Council for Working Life and Social Research (FAS), and the Swedish Research Council for Environment, Agricultural Sciences and Spatial Planning (Formas), while the agency was subsequently named the Swedish Agency for Innovation Systems (VINNOVA).

When the Government presented its bill in spring 2000 Hans Wigzell found that, in all essentials, the group's proposals had been followed.

"When it comes to the board composition of the Swedish Research Council, FAS and Formas, the bill even went a bit further, making the proportion of researchers even higher. What they rejected, which I think was a pity, was our proposal of a research delegation similar to the one they have in Finland. That was intended to be a body that would comprise the Prime Minister and some other senior minister, as well as the directors general of the research councils and key representatives of the business sector. The idea was to coordinate, and bridge the gap between, research and its application — a gap that people often complain is too wide in Sweden."

PHOTO: FOI PHOTO: ULF SIRBORN PHOTO: YNGVE RÅDSTEDT

Madelene Sandström, Director General of the Swedish Defence Research Agency (FOI); Professor Hans Wigzell of Karolinska Institutet and Agneta Bladh, Vice Chancellor of the University of Kalmar.

A working group headed by the Vice-Chancellor of Uppsala University, Bo Sundqvist, was assigned to draw up an organisation plan for the new Swedish Research Council. In August 2000, Madelene Sandström succeeded Olle Edqvist as secretary of the committee that was to implement the plan.

"It was a matter of bringing councils that had developed different characteristics with respect to forms of grant, ways of handling applications and, in particular, computer systems into line with one another. Very often they'd invested a tremendous lot in creating routines that the researchers placed their trust in. For us, it was very much a matter of damage reduction," says Madelene Sandström.

Research more visible in policy

Hans Wigzell, Madelene Sandström and Agneta Bladh have all now moved on to other appointments. Hans Wigzell has returned to his research at Karolinska Institutet. Madelene Sandström is now the Director General of the Swedish Defence Research Agency (FOI), while Agneta Bladh has been Vice Chancellor of the University of Kalmar since 2004.

From their respective positions, they can look back on five years with the new funding system. Although examples of suboptimal functioning are not lacking, they are convinced it was the right way to go. Madelene Sandström points out that research issues have become more visible in national policy since the Swedish Research Council was formed.

"If you're going to apportion issues in a big structure, there tend to be too many interests and the issue gets taken over before it's cleared up. I think it's been easier, too, for the Government to have a coherent organisation when they've wanted to give the system various assignments. The Committee for Educational Sciences is, for example, an initiative that wouldn't otherwise have a natural home, and the same applies to infrastructural issues."

Agneta Bladh thinks the Swedish Research Council had some luck, and quickly became a familiar concept outside the research community as well.

"We got a lot of attention at an early stage, for instance when the stem-cell debate started. When the Research Council adopted ethical guidelines for stem-cell research at the end of 2001, the national media gave it a lot of space."

All three are agreed that the inception of the Research Council has played a major role in strengthening Sweden's position internationally.

"There's definitely been an increase in our competence. You can see clearly in the EU, for example, that Sweden has gained a stronger player with the capacity to join effectively in the complex bureaucratic process," says Hans Wigzell.

Interdisciplinary level

According to Madelene Sandström the key difference compared with the former situation, however, is that the interdisciplinary level has come into being. This means that issues can be dealt with in a completely different way.

"Take the Committee for Research Infrastructures, which I myself chair. We're supposed to assess the whole field from the humanities to technology and see where the money can be put to best use, without doing the Scientific Councils' job. The Committee could never have obtained so much responsibility of its own if the Swedish Research Council hadn't existed."

Information issues to the fore

One area where favourable development has taken place since the Research Council's inception is, in Hans Wigzell's view, the size of government grants.

"I've been monitoring some parameters since the new councils were formed. One thing you see is that the growth in appropriations has outstripped

inflation, and most of all in Medicine. The grants are still extremely small compared with many other countries, but the trend is positive in every area."

Agneta Bladh thinks that information and communication issues have come to the fore and assumed more importance. As an example, she mentions that a communication plan is required even in applications for the Linnaeus Grant.

"It's an important signal. It means that you have to think about it at an early stage. For us, it meant that staff from our Communications Department worked closely with researchers when they were drawing up the application requirements."

Evaluation after three years

The only systematic evaluation of the Swedish Research Council to date was in 2004, three years after the Council started. Its author, the Danish political scientist Hanne Foss Hansen, found that the Research Council was fulfilling its core function of supporting basic research of the highest quality, well. In other respects, such as achieving coherence in and fostering interdisciplinary and multidisciplinary research, it was impossible to meet the original expectations in the first few years.

Madelene Sandström agrees that the concerted forces envisaged have not been much in evidence.

"When I was the deputy director general of VINNOVA, we had some discussions with the Research Council about cofunding, but not much happened. It's only recently, now that we've started giving large grants to groups and individual researchers, that we've been able to start talking about united forces."

However, the decision to discontinue support for two national facilities, the Manne Siegbahn laboratory and the Theodor Svedberg Laboratory, is one example where she thinks the Swedish Research Council has demonstrated the ability to assign priorities which was one aim of the reform.

"It would have been difficult to manage this within the framework of the old Natural Science Research Council. In that respect, I think a coherent structure like the Swedish Research Council is a precondition for effective action."

The fact that interdisciplinary and multidisciplinary studies have not progressed as much as it was hoped is, Hans Wigzell thinks, a disappointment. In his opinion, however, this was due more to the Government than the Research Council.

"From the start, the idea was that the Swedish Research Council should receive some millions of kronor, 270 if I remember rightly, for strategic initiatives. But then the Government and Riksdag earmarked most of the money so that only a small fraction was left. As a result, collaboration across subject and discipline boundaries hasn't increased as much as had been wished. That was the kind of thing the strategic contribution was to have been used for."

Not resulted in profiling

When the Swedish Research Council was formed, one idea was that it should assume national responsibility for speeding up the profiling of research at Sweden's higher education institutions (HEIs). In this respect, neither Madelene Sandström nor Agneta Bladh thinks that the Research Council has become the driver envisaged in the plan.

"But I'm not sure it's just down to the Research Council. First, it certainly was quite a vague remit the Government gave us. Second, I think the higher education institutions didn't want that help. In my opinion, they want to implement the strategy on their own," says Agneta Bladh.

Whether the amalgamation of the former research councils has influenced Swedish HEIs in any other way, they find it hard to say. However, Madelene Sandström thinks that the fact of assembling within a single Scientific Council expertise in Natural and Engineering Sciences, which was previously dispersed among different research councils, may have had some bearing.

"It would have been interesting to investigate whether the amalgamation had, for example, affected applications and collaboration between research in Natural and Engineering Sciences at universities."

The Research Council in 2011

At the time of an anniversary, it is natural to look back on the past. However, there are reasons why future prospects should not be disregarded. In which direction do the three hope the Swedish Research Council will develop in the next five years?

"I don't think I'm representative of my colleagues, but I hope that most of the funds will be granted in the form of strategically focused grants that HEI managements, not individual researchers, apply for. That's

the model the Linnaeus Grant is based on, although perhaps we haven't found the definitive forms yet," replies Agneta Bladh.

Hans Wigzell thinks it is important to keep increasing the size of government grants.

"I also hope the Government lives up to its original ambition, to grant an amount of some hundred million kronor to the Swedish Research Council centrally, to use for strategic initiatives spanning several subject areas."

Madelene Sandström's views are similar.

"I think we could be even better at making use of the scope afforded by the interdisciplinary level to work in a strategic, long-term way without vested interests taking over. And I think it would benefit the country if we ventured to use some of the funds in ways that are a bit bolder. In my view, there should be some kind of high-risk funding for young researchers with half-crazy projects." ✱

PHOTO: UWE ZUCCHI/SCANPIX SWEDEN

The initiative concerning Educational Sciences was implimented within the framework of the Swedish Research Council from the start. The Committee for Educational Sciences was formed under a Government directive in January 2001.

PHOTO: TORBJÖRN LÖVGREN, EISCAT KIRUNA

The Committee for Research Infrastructures (KFI), which is interdisciplinary, was set up in January 2005. The picture is from the EISCAT Scientific System, a large radar system in Nordkalotten.

PHOTO: PRESSENS BILD

When the Research Council adopted ethical guidelines for stem-cell research at the end of 2001, the national media gave it extensive coverage.

HISTORICAL SNAPSHOTS OF THE SWEDISH RESEARCH COUNCIL'S FIVE-YEAR HISTORY

- January 2001: five research councils amalgamated to form the Swedish Research Council.
- December 2001: ethical guidelines for stem-cell research were adopted.
- May 2002: the website 'forskning.se' was opened.
- October 2002: the Swedish Research Council decided to support only two of the then four national research facilities: the MAX-lab at Lund University and the Onsala Space Observatory at Chalmers University of Technology.
- January 2003: to obtain documentation for research policy, a publication database began to be used.
- November 2003: the Swedish Research Council's Research Policy Strategy was submitted to the Government as a basis for a new government bill on research policy.
- April 2004: the application system became fully electronic.
- January 2005: the Committee for Research Infrastructures (KFI) was formed.
- March 2005: under the Government Bill on Research, the Swedish Research Council's annual research budget was increased by SEK 1 billion, from 2.5bn in 2004 till 3.5bn in 2008.

SAD TO LEAVE THE RESEARCH COUNCIL

BY RAGNHILD ROMANUS

At the end of December 2006, Bengt Westerberg retired as Chair of the Swedish Research Council's Board. He had then held office for the full six years' statutory term permitted. He left his post with a certain melancholy. His commitment to research is strong, and he considers his time at the Council to have been an exciting one.

When Bengt Westerberg is asked how it feels to step down as Chair, his answer is emphatically clear.

"It's sad to leave the Research Council. Usually, when I've left an assignment I've felt 'That's enough, it's time to go.' But not this time."

'A stimulating and enjoyable time' is how Bengt Westerberg sums up his six years at the Research Council. He joined at the outset, in January 2001, when the Council was formed by the amalgamation of five agencies.

Broad scientific competence

Early on, the gains from coordination became clear. Just six months after the start, the Research Council became involved in issues relating to stem-cell research. In December 2001, ethical guidelines for this research were adopted.

"Thanks to the wide-ranging scientific competence assembled under our roof, the Research Council was the self-evident stakeholder on this issue."

In retrospect, taking a stand on stem-cell research is one of the decisions Bengt Westerberg is most proud of. He is also very pleased with the microdata research initiative that began in spring 2006. Here, too, research spanning a range of subject areas was involved. This particular type of initiative is the Swedish Research Council's strength.

"Microdata research is an area where Sweden can achieve a great deal, thanks to our unique register based on personal identity numbers."

This is the Research Council's largest single initiative. As a researcher-controlled agency, the Council earmarks very little of its funds. The 'bottom-up' procedure is the basic principle.

Knowledge of conditions

As well as the gains from coordinated research funding, the Government's need for analyses and documentation for its research policy was one of the principal arguments underlying the inception of the Swedish Research Council. Here, Bengt Westerberg emphasises, the Council has a tremendously important role to play. He stresses the usefulness of studies to date on such matters as citation statistics and cost trends for research in higher education.

"But the expertise required for documenting research-policy options can be considerably strengthened. For example, we need better knowledge on conditions for researchers in Sweden."

Respect calls for communication

The Swedish Research Council's function of developing research communication in Sweden is also crucially important, Bengt Westerberg thinks, especially to secure public support for continued and expanded investment in research.

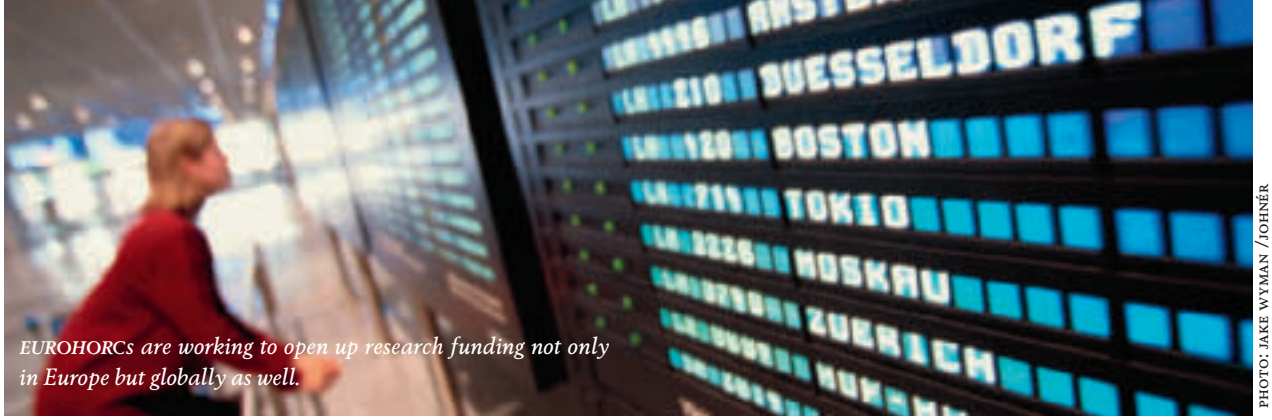
"Ordinary citizens have to feel confidence in researchers and research, and they must know something about what the researchers are doing. They have to feel respect for research, and count on its being in line with ethical principles. Here, communication has a key part to play."

Bengt Westerberg himself has long had a keen interest in research. This was what prompted his acceptance when he was offered the post of Board Chair.

"If there's one thing I regret in my life, it's that I didn't become a researcher. I've always been interested in research. I think there's more respect for facts, knowledge and training in a society with an outstanding research sector. It's a more rational society, and that's good for us as citizens." ✱

PHOTO: LARS EPSTEIN/SCANPIX

At the end of December 2006, Bengt Westerberg retired as Chair of the Swedish Research Council's Board.



EUROHORCs are working to open up research funding not only in Europe but globally as well.

PHOTO: JAKE WYMAN /JOHNÉR

EUROHORCS PRESIDENT'S GLOBAL THINKING

BY ANDERS NILSSON

Assembling 25 uncoordinated nations and their research to form an effective European research region is just a beginning. The new President of EUROHORCs, Pär Omling, also wants it to be easier for researchers to migrate among the continents.

EUROHORCs (EUROpean Heads Of Research Councils) is an informal association of the heads of national public organisations in Europe that fund and perform research. These bodies, including the Swedish Research Council, jointly fund most European basic research.

At New Year 2007, the Research Council's Director General Pär Omling took up his new position as President of EUROHORCs for the next two years.

Coordinating 25 countries

The Swedish Research Council is active in numerous international cooperative organisations at the Nordic, European and global levels.

"The innermost essence of research is international," says Pär Omling. "Throughout my life as a researcher, I've never thought about 'Sweden' or 'Europe' but, rather, 'the World' That's why it's a problem that funding is nationally or regionally based to such a high degree. EUROHORCs and other cooperative organisations' work is largely about opening up the funding and finding ways of collaborating with the other funding agencies."

EUROHORCs' ambition is to transform the 25 European states, which all have their own research agendas and priorities, into a research region in which funding is coordinated, effective and no longer based on national interests.

Moving among the continents

The European perspective is central in the Research Council's international activities, but Pär Omling emphasises that this by no means represents a retreat from the rest of the world.

"Parallel to the coordination that's under way between the European nations, Europe is working to open up funding at global level and make it easier for researchers to collaborate and move around from one continent to another. The aim of all this work is for researchers to be as free, with as few ties, as possible and to be able to work to the best effect without needing to think where their funding is coming from."

As Pär Omling points out, the issue also, of course, has a competitive aspect. European coordination is needed to boost competitiveness in the global scientific arena.

"Competition and cooperation go hand in hand. This dualism is often found in research. Competition is a key driver: we foster one another's new successes. At the same time, we want to be able to collaborate when it's beneficial to research."

In Pär Omling's view, Europe needs new career paths, funding opportunities and infrastructure to attract researchers worldwide.

"There's an alarming trend of bright young people going to do their postdoctoral research in the United States and then staying there."

Portable funding

EUROHORCs was founded in the 1990s as an informal forum for the exchange of experience among a number of large-scale national funding agencies. Since then, this cooperative body has developed, and nowadays it takes its own initiatives.

In terms of European cooperation, one concrete success is the MFR ('Money follows Researcher') agreement, whereby researchers can take their funding with them when they cross European frontiers. Another success is the European Young Investigator Awards (EURYI) established for promising young researchers.

Read more at www.eurohorcs.org. *

TIGHTER GENDER-EQUALITY REQUIREMENTS

BY RAGNHILD ROMANUS

On the whole, men and women are equally successful when they apply for support from the Swedish Research Council. However, women's and men's success rates differ in some subject areas and forms of support.

The Research Council has adopted a new Gender Equality Strategy and studied women's and men's success rates in obtaining the Council's research support in the period 2003–06.

Gunnel Gustafsson, Deputy Director General at the Swedish Research Council and Director of Research Policy Analysis, states that two of the three main objectives in the strategy have been fulfilled.

First, there is an even gender distribution in evaluation panels and decision-making bodies at the Council. Secondly, the proportions of women and men among applicants for the Council's grants correspond to the gender distribution among postdoctoral female and male teachers and researchers at Sweden's higher education institutions (HEIs).

The third objective of the strategy is that men and women applying for Research Council grants should have the same success rates. This aim has not yet been entirely fulfilled. The Council's analysis of its research support in 2003–06 shows that the fulfilment of the objective varies from one subject area and form of support to another.

In 2006, women and men attained approximately the same success rates in applications for infrastructure support, Postdoctoral Fellowships, Postdoctoral Positions in Sweden and Junior Research Positions.

On the other hand, there was a low proportion of women in the applications selected and submitted by universities for the new Linnaeus grants for research environments in 2006, and an even lower proportion of women among the successful applications selected by the international review panels appointed by the Swedish Research Council.

Furthermore, for Project Research Grants, men's success rate was higher than women's. This was due to the outcome in two of the subject areas. As in previous years, women were less successful than men in Medicine. Moreover, in 2006, women had less success than men in Humanities and Social Sciences, in contrast to the period 2003–05. Women were less successful than men even when 'career age' is taken into account. (Career age means the time that has the elapsed since the applicants earned their PhDs.)

"In order to overcome these differences we are now tightening the requirements on the Scientific Councils' written justifications of any differences between men's and women's success rates in their fields of responsibility. These justifications are to be presented to the Board and the Director General of the Research Council. They were called for in connection with the decisions taken by the Scientific Councils in 2006, but the outcome indicates that the instructions weren't clear enough," says Gunnel Gustafsson, the Research Council's Deputy Director General.

The Scientific Council for Medicine will de-identify this autumn's postdoctoral applications so that the sex of the applicant cannot be seen in the course of the evaluation. In this way, unconscious differences in assessment of applications depending on whether they come from women or men can be avoided. *

PHOTO: MARIE ULLNERT/PRESSENS BILD

The gender distribution of researchers varies between different subject areas. In Medicine, the proportion of women among researchers and teachers with PhDs in higher education in Sweden was 41% in 2004. The corresponding figure in Natural and Engineering Sciences was 17%.

Katarzyna Chmielarska has received a Grant for Postdoctoral Position in Sweden at Malmö University Hospital, Lund University.

GENDER-EQUAL SWEDEN EXERTED ATTRACTION

BY JESSICA RYDÉN

Through the Swedish Research Council, foreign researchers can obtain funding for their postdoctoral positions in Sweden. One such person, who has applied for and received a Grant for Postdoctoral Position in Sweden, is the Polish biochemist Katarzyna Chmielarska. To her, one of the attractions was Swedish gender equality.

"As a woman researcher, it's considerably easier to make a career in Sweden than in many other countries," says Katarzyna Chmielarska.

After gaining her PhD at the Max Planck Institute in Munich, Katarzyna Chmielarska took up a postdoctoral position in Sweden in January 2006. Having a Swedish husband obviously contributed to the decision, but was not the whole explanation. She also sees big advantages in living in a country where gender equality is given priority, in research as in sectors.

"In Germany, I was well received as a woman in day-to-day work, but the majority of professors were men and sometimes it felt as if it would be difficult to advance. In Sweden, women and men are treated equally in getting appointments and applying for grants."

Today, Katarzyna Chmielarska belongs to a research group at the Department of Laboratory Medicine at Malmö University Hospital, Lund University. She is happy there and talks about the good working relationships and friendly atmosphere at the laboratory. Her postdoctoral position also represents an opportunity to use, in a completely new area, the techniques and knowledge she learnt in her thesis work.

Regulating growth of cancer cells

"In my PhD thesis work I was studying what is called SUMO modification*, a process that can affect a cell's growth and death. Now I'm using that knowledge to study how a particular protein regulates the survival of tumour cells. The hope is that we'll be able to go in and prevent the growth of cancer cells at the molecular level."

Research in the Swedish laboratory has already yielded good results, Katarzyna Chmielarska relates. She is loath to reveal exactly how, since the new findings have not yet been published.

"But it's a matter of research that indirectly, in the long run, may result in better treatment of breast cancer," she explains.

At present, however, matters other than research are dominating Katarzyna Chmielarska's life. For the past few months she has been on maternity leave, devoting her time to her baby. But she is looking forward to resuming her postdoctoral position in the future.

"I'm absolutely set on continuing my research career in Sweden."

Read more about grants for postdoctoral positions in Sweden at www.vr.se ✱

* SUMO stands for 'Small Ubiquitin-Related Modifier', and SUMO modification means attaching a SUMO molecule to a protein.

GRANTS FOR GUEST PROFESSORSHIPS

To promote internationalisation of Swedish research and mobility among researchers, the Swedish Research Council is calling for guest professorship applications by researchers wishing to make a move from other countries to Swedish higher education institutions.

The **Olof Palme Guest Professorship** is intended for a researcher whose work has a bearing on peace.

The **Kerstin Hesselgren Guest Professorship** was set up in memory of Sweden's first female member of the Riksdag (Swedish Parliament). This professorship is awarded to an eminent woman researcher from outside Sweden.

Guest Research Professorships in Medicine are new from 2007. These have been announced to enable researchers from other countries to take part in research at laboratories and clinics in Sweden.

The **Tage Erlander Guest Professorship** enables internationally eminent researchers in the Natural and Engineering Sciences to spend a year in Sweden. This professorship was set up by the Riksdag (Swedish Parliament) in 1981 to honour the former prime minister Tage Erlander on his 80th birthday.

Collaboration Grants in Medicine

Another opportunity for researchers outside Sweden to collaborate with Swedish colleagues is provided by the Collaboration Grants that the Research Council has introduced in Medicine.

The purpose of these grants is to strengthen collaboration among various medical fields, or between medical research and research in other disciplines. Another aim is to give young researchers the chance to compete on equal terms with senior researchers.

The majority of applicants for a Collaboration Grant must come from the same higher education institution in Sweden. However, one or more researchers can come from another Swedish or foreign university.

Read more at www.vr.se ✱

PHOTO: TECHNISCHE UNIVERSITÄT, DARMSTADT

The nucleus of the atom, and the forces exerted among the particles in this nucleus, are the research field of Achim Richter, Professor of Physics at Darmstadt University of Technology in Germany. During 2006 he held the Tage Erlander Guest Professorship and was installed at Örebro University. Achim Richter, who is one of the world's foremost nuclear physicists, has long collaborated with Swedish research groups.

SWEDISH RESEARCH LINKS:

ECOSYSTEMS 120 MILLION YEARS AGO

BY THOMAS HELDMARK

How has the interplay between animals and plants generated the biodiversity of today? This question is the focal point for the collaboration between Else Marie Friis, a palaeobotanist from the Swedish Museum of Natural History in Stockholm, and Professor Zhou Zhonghe of the Institute of Vertebrate Paleontology and Paleoanthropology at the Chinese Academy of Sciences.

Their project has been funded by the Swedish Research Links Programme for three years. The purpose of the Swedish Research Links Programme is the exchange of knowledge and techniques of common interest to researchers in Sweden on the one hand and developing countries on the other.

Zhou Zhonghe, one of the world's foremost palaeontologists, is an expert on vertebrates and birds in

MARIE CURIE BROADENS THE MIND

BY METTE HULTGREN

After eight years at various universities in the US, Barbara Nozière wanted to return to Europe. Thanks to the Marie Curie Programme, she found herself at Stockholm University, with a post as Guest Professor.

Barbara Nozière was originally a chemist. After obtaining her doctorate at the University of Bordeaux in 1994, she spent a few years in Germany followed by eight years in the US. When she began putting out feelers with a view to returning to Europe, it proved difficult to find a position equivalent to her Assistant Professorship at the University of Miami. Someone told her about the Marie Curie Programme, which provides European placements for academics returning to Europe.

"I was keen to work at the Department of Meteorology at Stockholm University, so I contacted them. We wrote a joint application for a Marie Curie Fellowship," she relates.

In December 2005, Barbara Nozière arrived at Stockholm University. Here, for three years, she is establishing a new research specialisation.

"The connection between Chemistry and Meteorology we want to make here hasn't been made yet. So it's new, internationally as well."

Moving around benefits research, in Barbara Nozière's opinion.

"Research cultures vary so much from one country to another. You learn a lot by staying in new places." *

THE MARIE CURIE PROGRAMME

This programme is part of the EU Seventh Framework Programme. Its purpose is to foster mobility among researchers in Europe, and encourage researchers to stay in Europe, but also to attract researchers to return home or come to Europe. Another aim is to bring about intersectorial mobility, so that researchers move from one field to another with their knowledge, or between basic and applied research.

The duration of a Marie Curie Fellowship varies from two months to three years. Most of the fellowships are applied for at PhD and postdoctoral level, but there are also Marie Curie Excellence Grants, Marie Curie Excellence Awards and Marie Curie Chairs. Read more at www.cordes.lu/mariecurie-actions.

Barbara Nozière, Stockholm University

PHOTO: MIA ÅKERMARK

particular. He has access to China's copious fossil resources, both plant and animal.

"We've exchanged invaluable knowledge about the ecosystems that prevailed 120 million years ago," says Zhou Zhonghe.

The ecosystems of our own day, with their flowering plants, mammals and birds, started to take shape at that time, in what is known as the Cretaceous period. Before then, many animal and plant groups had developed, only to disappear.

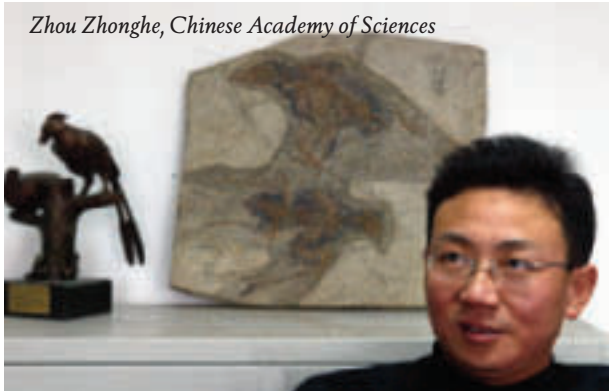
"Now we've gained a better overall grasp of what the flora and fauna were like, and how they interacted with one another and the surrounding environment. Let's hope that more researchers will join the project in the future," says Zhou Zhonghe. *

THE SWEDISH RESEARCH LINKS PROGRAMME

This programme gives Swedish researchers opportunities to forge new contacts and develop joint projects with colleagues in Asia, the Middle East and North Africa region (MENA) and South Africa. Funds from Swedish Research Links are intended to cover the extra costs arising from this collaboration. The projects may relate to any discipline or field.

The Programme is funded by the Swedish International Development Cooperation Agency (SIDA), while the Swedish Research Council is responsible for the scientific assessment of applications through a committee.

Read more at www.vr.se.



Zhou Zhonghe, Chinese Academy of Sciences

PHD STUDENTS CITED EQUALLY OFTEN

BY ANDERS NILSSON

What happens to scientific quality when an ever growing share of research at Swedish higher education institutions (HEIs) is conducted by inexperienced doctoral students? Two reports from the Swedish Research Council take a close look at the expansion of postgraduate education. They conclude that, granted, postgraduate studies account for nearly half of the HEIs' research costs at present, but that they also yield results in the form of theses that, in quality, match the work of senior researchers.

In 1991 there were some 14,000 active PhD students in the Swedish university world. By 1998 there were close to 19,000 — a third more. As for PhDs awarded, there were 1,250 in 1991 and in 2006 more than twice as many doctoral students — around 2,700 — were defending their doctoral theses.

Does such a marked change have an impact on research? Have the quantitative degree targets had a detrimental effect on the quality of research? Are the PhD students dragging down the average level of Swedish research, either by themselves producing theses of lower quality than the work of their senior colleagues or by, quite simply, draining the HEIs' funds so that the quality of other research is impaired?

Bibliographic comparison

These questions are the background to the Swedish Research Council's bibliographic comparison, in its study *Svenska avhandlingars kvalité och struktur* ('The Quality and Structure of Swedish Theses'), between articles in theses and aggregate production of scientific articles. The author of the report, Staffan Karlsson of the Research Council's Department for Research Policy Analysis, emphasises that general conclusions about Swedish research cannot be drawn on the basis of the report. Its study material comprises articles from five faculties at three HEIs over a year. Monographs are not included, and this means that the Humanities are entirely lacking from the survey.

"The report provides no definitive answers to the question of how the expansion of postgraduate education has affected research. It's more of a basis for discussions. But it's worth noting that we found no indication whatsoever that the expansion of postgraduate studies has made research worse," says Staffan Karlsson.

Not simultaneous

The survey covers 448 compilation theses in the Social Sciences, Medicine, Engineering and Natural Sciences presented at Karolinska Institutet, the Royal Institute of Technology and Uppsala University during 2001. It shows that Swedish PhD students' articles are cited on the same scale as articles written by established researchers, and that they are also published in journals that are at least as prestigious. In several respects, the thesis articles actually show slightly better figures than other articles. This is because they contain a higher proportion of frequently cited and a lower proportion of infrequently cited works, and because they are published in journals of somewhat higher status. However, the disparities are relatively small.

A breakdown among HEIs and faculties shows a considerably more fragmented picture, and the same applies within each subject area. Medical thesis articles at Karolinska Institutet are, for example, cited to a substantially greater extent than the faculty's other production, while the reverse is true of the Faculty of Medicine in Uppsala.

Citation of Swedish scientific publications has remained fairly stable at around 10% above the world average for several decades. The rest of Europe, on the other hand, has improved its statistical performance and Sweden has thus, in a European perspective, lost ground. The report investigates whether there is any covariation in time between the expansion of postgraduate education and Sweden's relative decline in terms of citation. The answer appears to be that there is not. It was during the 1980s that Sweden lost ground, above all, while the major expansion of postgraduate studies came later, in the 1990s.

Incomplete picture

Göran Bexell, Vice-Chancellor of Lund University and, since New Year 2007, Chair of the Association of Swedish Higher Education (SUHF), is not surprised at the findings in the report.

"Neither I nor the Deans I've talked to have any other perception than the conclusion of the report: that postgraduate education has not had an adverse impact on research quality."

Sometimes, however, he gets the comment that the actual postgraduate studies have been greatly improved,

but that owing to time pressure the theses have not shown the same improvement in quality. He is unwilling to draw any far-reaching conclusions from the report.

"Bibliometry is a key measuring method, but it doesn't provide a complete picture. There are other aspects of quality."

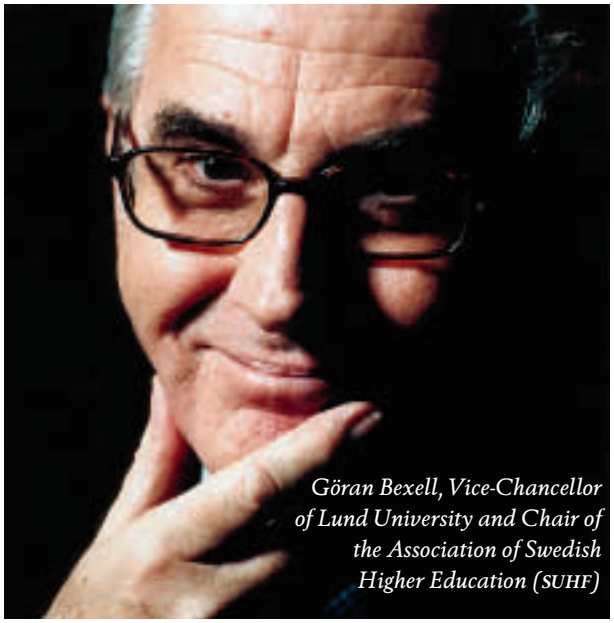


PHOTO: KENNETH RUONA

Göran Bexell, Vice-Chancellor of Lund University and Chair of the Association of Swedish Higher Education (SUHF)

Effective postgraduate education

The other report, *Forskarutbildningen i Sverige* ('Postgraduate Education in Sweden') gives a more in-depth picture of how postgraduate studies have expanded and changed over the past few decades. PhD students have proliferated, and the number of PhDs awarded annually has also risen. But efficiency, too — measured as the degree completion rate and average duration of studies — has considerably improved.

The net study period for PhD students decreased by 14% — more than six months — between 1991/92 and 2002/03. Today, it varies between 3.4 years (Medicine) and 5.5 years (Humanities). The degree completion rate, i.e. the proportion of doctoral students who obtain their PhDs, shows even greater improvements. The current degree completion rate for PhDs, in terms of the gross study period after admission, is estimated at between 64% (Engineering Sciences) and 83% (Natural Sciences). With licentiate degrees included in the figures as well, present-day rates are even higher — up to 88%.

This represents a rapid rise compared with the rate for PhDs admitted in 1993/94, among whom only 32% in the Humanities and 46% in Engineering Sciences had obtained PhDs after eight years. The increase is even more striking compared with PhD students admitted in 1972–78, whose degree completion rate within the 13 years after their admission was below 20% in both the Humanities and Social Sciences.

Forty-eight per cent of costs overall

According to the calculations in the report, PhD students' subsistence costs currently account for some 20% of the HEIs' expenses for research and postgraduate education. The aggregate costs of postgraduate studies — including, for example, supervision and all overheads — are estimated at 48%, although the report authors take care to point out that the figures are highly uncertain.

"One reason is that it's difficult to distinguish between thesis work and what constitutes other research today," says Staffan Karlsson. "The PhD students often belong to research teams and have senior researchers as coauthors of their articles."

He stresses the fact that the figure of 48% comprises very much more than the cost of education itself.

"A whole lot of research has been carried out for that money. Very roughly speaking, every other Swedish research article is included in a thesis."

According to Statistics Sweden (SCB), active PhD students make up about 40% of the Swedish research community, in terms of full-time and annual job equivalents. *

Medical thesis articles at Karolinska Institutet are cited to a substantially greater extent than the faculty's other production, while the reverse is true of the Faculty of Medicine in Uppsala.

PHOTO: ULF SIRBORN

ALLOCATING RESOURCES — A BALANCING ACT

BY RAGNHILD ROMANUS

Prospects of obtaining project funding vary tremendously for researchers in different subject areas. At the Scientific Councils, various principles are applied in the allocation of funds – from small sums to many researchers, on the one hand, to large amounts to the few.

Only a tenth of researchers in the Humanities and Social Sciences can count on obtaining money when they apply for project support from the Swedish Research Council. Those who succeed despite the stiff competition are, on the other hand, rewarded handsomely by getting almost all the funds they apply for. In Medicine, the situation is quite different: one in three researchers obtains funding, but only a small proportion of what they have applied for, and to complete their projects researchers must often secure funds from elsewhere.

The fact that the Scientific Councils for Medicine, on the one hand, and Humanities and Social Sciences on the other have such different priorities in their distribution of research funds stems partly from the traditions of the independent councils that existed before the Swedish Research Council was formed. It is also partly due to the nature of the funding situation for different fields, thinks the Research Council's Deputy Director General, Gunnel Gustafsson.

"There are relatively many funding bodies to apply for funding from in Medicine. There, support from the Swedish Research Council serves as a mark of quality that can 'open other doors'. In the Humanities and Social Sciences, on the other hand, grants are traditionally awarded to projects with a distinct beginning and a clear-cut end."

Both attitudes have their dilemmas. When the Scientific Councils seek the maximum benefit from the funds at their disposal by spreading them among small grants, there is a risk of projects being put on the back burner and researchers having to devote a great deal of time to applying for funds from other sources. Giving large grants, on the other hand, means that fewer applications can be approved.

PHOTO: DENNY LORENTZEN

Gunnel Gustafsson, the Swedish Research Council's Deputy Director General

"We're obliged to turn down a tremendous number of good applications," states Gunnel Gustafsson.

To provide support for the several hundred world-class applications that currently fail to get funding, an annual increase of SEK 175 million in the government grant would be needed, according to the Research Council's research strategy for the years 2005–08. With an increment of that magnitude, the overall approval rate could rise to 30% from its current level of 20%. *

	Humanities and Social Sciences	Medicine	Natural and Engineering Sciences	Educational Sciences
Percentage of applications approved:	11%	31%	24%	18%
Percentage of funding applied for approved:	67%	21%	49%	73%
Average grant (SEK):	629,000	487,000	641,000	646,000

In the Swedish Research Council there are two Scientific Councils and a Committee that each support basic research in their areas of activity. There is also a Committee for Research Infrastructures.

In the following pages, the Secretaries General of the Scientific Councils and Committees describe the research for which they are responsible; areas in which Swedish researchers are particularly successful; what problems and challenges exist, and how they can be tackled.

PHOTO: STEFAN BORGIUS

ARNE JARRICK

Secretary General
Scientific Council for Humanities and Social Sciences
Swedish Research Council

PHOTO: STAFFAN ANDERSSON/SYDPOL.COM/IBL

The research funded by the Scientific Council for Humanities and Social Sciences at the Swedish Research Council spans a broad range of research, from the more scientific fields like Experimental Psychology and Practical Archaeology to more distinctly cultural subjects, such as Ethnology and Literary Studies, taking in History, Economics and Sociology on the way.

What all this research has in common is that it is about people: their attempts to understand their existence and themselves, to take decisions and to let these decisions culminate in action.

Although generations of Humanities and Social Sciences graduates have made their mark in social debate and the international research market, we have an external problem. This is to fully convince the outside world, both within and outside the research community, of the vital social importance of our fields of knowledge. One internal problem is that researchers should, to a greater degree than to date, expand their collaboration with one another and with representatives of other scientific fields, within and beyond Sweden's borders.

There are two strategies for meeting these challenges. The first is to use simple, clear-cut forms of support to increase researchers' desire for boundary-crossing collaboration. The second is to increase the interface with the stakeholders of research in various ways.

One way of enlarging this interface is the open seminars on key themes that we arrange quarterly. Another is to feature in key political contexts. In July 2007, the Scientific Council shall therefore be taking part in 'Almedal Week' on the island of Gotland, where representatives of Sweden's political parties are to convene.

During 2007, the Scientific Council shall have a focused initiative in research on research policy. In the future, the element of focused initiatives will increase somewhat. Nevertheless, research initiated by researchers themselves will continue to receive the greater part of our support in absolute terms.

PHOTO: TORBJÖRN ZADIG

ARNE JOHANSSON

Secretary General
Scientific Council for Natural and Engineering Sciences
Swedish Research Council

ULF P. LUNDGREN

Secretary General
Committee for Educational Sciences
Swedish Research Council

The Scientific Council for Natural and Engineering Sciences at the Swedish Research Council has an area of responsibility that extends from, for example, Pure Mathematics and Subatomic Physics to technology-oriented subjects like Semiconductor Physics and Mechanical Engineering.

It is obvious that the Biosciences have grown in strength for a number of years, and that major advances are under way in the Nanosciences. The project that was awarded the largest grant in 2006 concerned new X-ray methods that will be able to provide images with resolution ten times higher than present-day X-ray sources.

Since 2005, an initiative to develop basic research in the Engineering Sciences has been in progress. In cooperation with other Swedish funding providers, the Scientific Council strengthened its initiatives in basic energy research and Medical Technology in 2006. Issues relating to climate change have also been part of a focused initiative in which we have collaborated with other funders. This initiative is to be expanded and given broader coverage in 2007.

The competition situation in the Natural and Engineering Sciences has become more globalised than ever before. To enable Sweden to retain its position as a successful knowledge nation, the Council wishes to raise the approval rate to put more good research ideas into practice; increase the average grant size; expand resources for medium-cost scientific equipment; and invest in young researchers.

Giving promising young researchers a good start to their academic careers is an urgent priority for the Scientific Council. We have, for example, recently established a coherent programme for junior researchers.

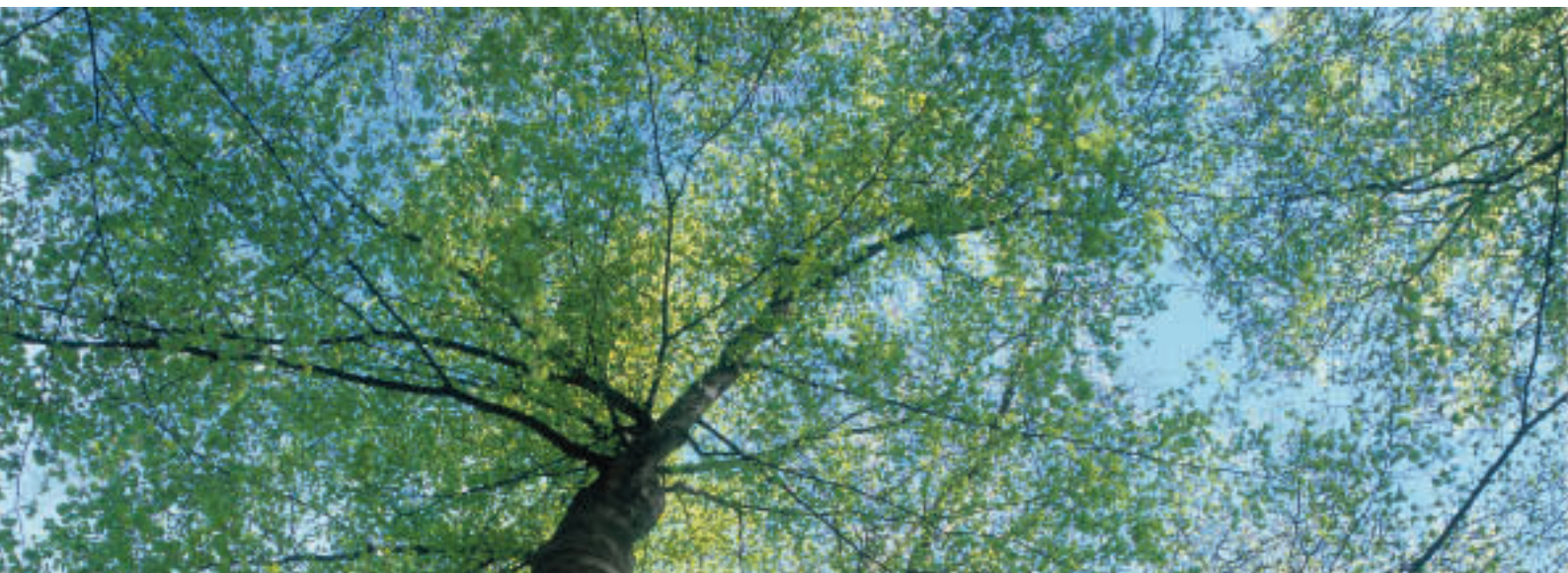
The Committee for Educational Sciences at the Swedish Research Council is responsible for funding research on these sciences, i.e. the kind of research that focuses on learning and education. This research is multidisciplinary, spanning all faculties and a wide range of disciplines. Research funded by the Committee concerns the brain's capacity to remember, learning, didactic subject studies, educational sociology, the history of education and studies of education policy, to name but a few fields.

The greatest challenge to the Committee's work is the social changes that are giving education and learning an ever expanding role in relation to production and society. Nowadays, for many people, lifelong learning is a reality. A well-informed response to this development is essential: education and learning must be pursued effectively and high quality sustained.

In order to build capacity in new fields for Educational Sciences, the Committee has been funding Doctoral Programmes since its inception in 2001.

Internationally, Sweden has been noted for its strong research in Educational Sciences. This research originated with the investigations carried out in conjunction with school reforms in the postwar period.

The strategy that will pave the way for Sweden's further development in Educational Sciences is oriented towards developing the internationally strong sides of our research.



HÅKAN BILLIG

Secretary General
Scientific Council for Medicine
Swedish Research Council

LARS BÖRJESSON

Secretary General
Committee for Research Infrastructures
Swedish Research Council

Swedish medical research is of world class. This country's researchers have successfully contributed to the development of methods and techniques in several fields, in ways that have been widely disseminated internationally.

The Scientific Council for Medicine at the Swedish Research Council supports research throughout the discipline of Medicine, i.e. Medicine itself and also Odontology, Pharmacology and Health Sciences. Infectious diseases and brain disorders, for example, are strong areas of Swedish research.

Sweden aims to take more responsibility for research issues that relate to global health. To obtain a comprehensive grasp of the whole field of health research, the Scientific Council for Medicine considers that all external state resources for health research in Sweden should be pooled in a single organisation.

One major challenge to Sweden is clinical research. Clinical research is a vital link between basic medical research and high-quality healthcare. The Scientific Council will work for improved coordination, dissemination of new knowledge and quality assurance in healthcare.

Another challenge is to adopt an all-round national approach to infrastructure for medical research. Sweden is at the cutting edge in this field, but could perform even better thanks to our supply of extensive, well-classified patient records and registers of ill-health.

Another key issue for the future is promoting young researchers' opportunities for research careers, especially in the light of the approaching generation change.

The main responsibility of the Committee for Research Infrastructures at the Swedish Research Council is to foster and support the establishment and use of infrastructure for Swedish research of the highest scientific quality in all subject areas.

Sweden's first long-term strategic plan for research infrastructure, *The Swedish Research Council's Guide to Infrastructure*, was issued in 2006. This year, it is already being updated. This publication raises general issues concerning the availability and funding of infrastructure, and provides recommendations and strategies for both new infrastructure and upgrading of existing facilities. The Guide covers infrastructure for all academic disciplines. Sweden's emerging role in European and global infrastructure is one key aspect addressed.

Today, Swedish researchers use research infrastructure at numerous levels. In certain fields, such as Particle Physics and Astronomy, dependence on global collaboration with respect to accelerators and telescopes is total. In others, the same need to collaborate in terms of international infrastructure has not been felt to date.

One challenge facing the Committee is to encourage establishment of shared, competitive infrastructure in areas that have hitherto invested in it only on a limited scale. Other challenging tasks are to make research infrastructure accessible; join in the development and use of pan-European and international infrastructure; coordinate resources for infrastructure and equipment; develop forms of grant for supporting development and use of research infrastructure; and make use of the extensive research opportunities that e-scientific infrastructure affords.

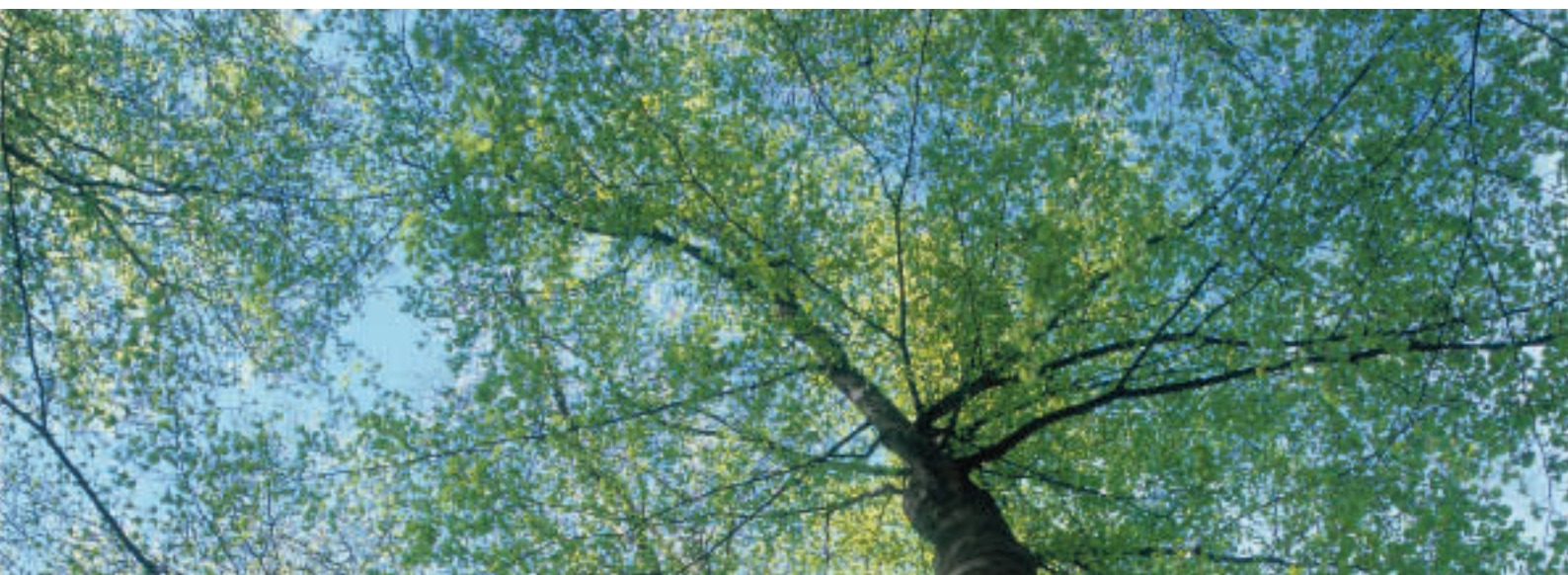


PHOTO: SCIENCE PHOTO LIBRARY/IBL BILDBYRÅ

Dan Andersson

PHOTO: ANDERS NORDERMAN

Today, we are seeing ever more bacterial strains that no antibiotics can destroy.

A RACE AGAINST TIME

BY ANN-MARIE DOCK

Antibiotic-resistant bacteria are a threat that is growing increasingly fast. In the EU, a major expansion of research is taking place and the hope is that the trend can be arrested. Research, then, involves a race against time – to find the solution before the problem is beyond solving.

Antibiotics have been used with great success against various infectious diseases ever since the 1940s. In the first few decades of their use, resistance was a largely unknown phenomenon. Today, we are seeing ever more bacterial strains that no drugs can destroy. Globally, antibiotic resistance has made it more difficult to treat certain infectious diseases, and rising mortality is the result.

Professor Dan Andersson is a microbiologist at Uppsala University and an eminent researcher in the field. He is also the coordinator for a newly started EU project. Ten research groups in seven countries are to study how resistance arises, and how resistant bacteria are spread in various environments.

"The emergence of resistance is due to many factors. What we ourselves can influence is how we use antibiotics, how often and how much, and what we do to prevent the spread of infection. What is more difficult is identifying and surveying all the mechanisms used by the bacteria to evolve resistance," says Dan Andersson.

Transfer of resistance genes

With his colleagues, however, Professor Andersson has made substantial progress in understanding the development of resistance. Their studies of such bacteria as salmonella, staphylococci and tubercle bacilli (TB) show that resistance can arise both through mutations in bacteria and through the transfer of resistance genes from other bacteria, which may be of a completely different kind.

Thus, bacteria that form part of our normal flora (and do not make us ill) can be resistant to penicillin and transfer their resistance to pathogens (agents that cause disease), such as pneumococci. Accordingly, the normal bacterial flora becomes a reservoir for resistance genes.

Today there are hundreds of antibiotic medications, falling into some ten primary categories, that act on different mechanisms in the cell. But there are many more steps that have been impossible to use to date. In Dan Andersson's view, the best form of attack is to block key functions, such as those of enzymes, which affect many other processes in the cell. He thinks it will be feasible in the long term to give drugs a more rational design.

Up to now, the development of resistance has not been studied seriously in the production of antibiotics. The problem is that so few pharmaceutical companies are engaged in developing new preparations. Much of this research has been discontinued since it is considered, quite simply, unprofitable.

Although we in Sweden have been relatively spared from highly resistant bacterial strains to date, Dan Andersson thinks it is just a matter of time before they break out on a major scale.

"All we can do is try to trace the source of infection and then prevent it spreading further. But it will be difficult," says Dan Andersson. *

FUTURE OF HEALTHCARE RESEARCH

Healthcare research has developed rapidly over the past few years. Several focused initiatives have contributed to this development. During 2001–04, on behalf of the Government, the Swedish Research Council allocated a total of SEK 80 million to projects and services in Health Sciences.

How can Healthcare Sciences, in the future, compete with other subject areas for the Research Council's funding? This question was central at a seminar in June 2006 attended by researchers from various Swedish universities.

Successful research in Health Sciences is currently under way at several higher education institutions. However, several of the seminar participants were of the view that the field needs further support. To succeed better in competition with other fields, research should become more international and boundary-crossing. At the same time the importance of a broader focus, to enable research to attain a critical mass, was emphasised. The participants also called for career paths for young researchers and stronger academic leadership; and how to define 'Health Sciences' was regarded as an important question.

The Swedish Research Council's support for young researchers' positions was considered to be of the utmost importance. The need to develop cutting-edge skills and to invest in appointment structure instead of providing project research grants were other opinions put forward. *

SEK 81M FOR MEDICAL TECHNOLOGY

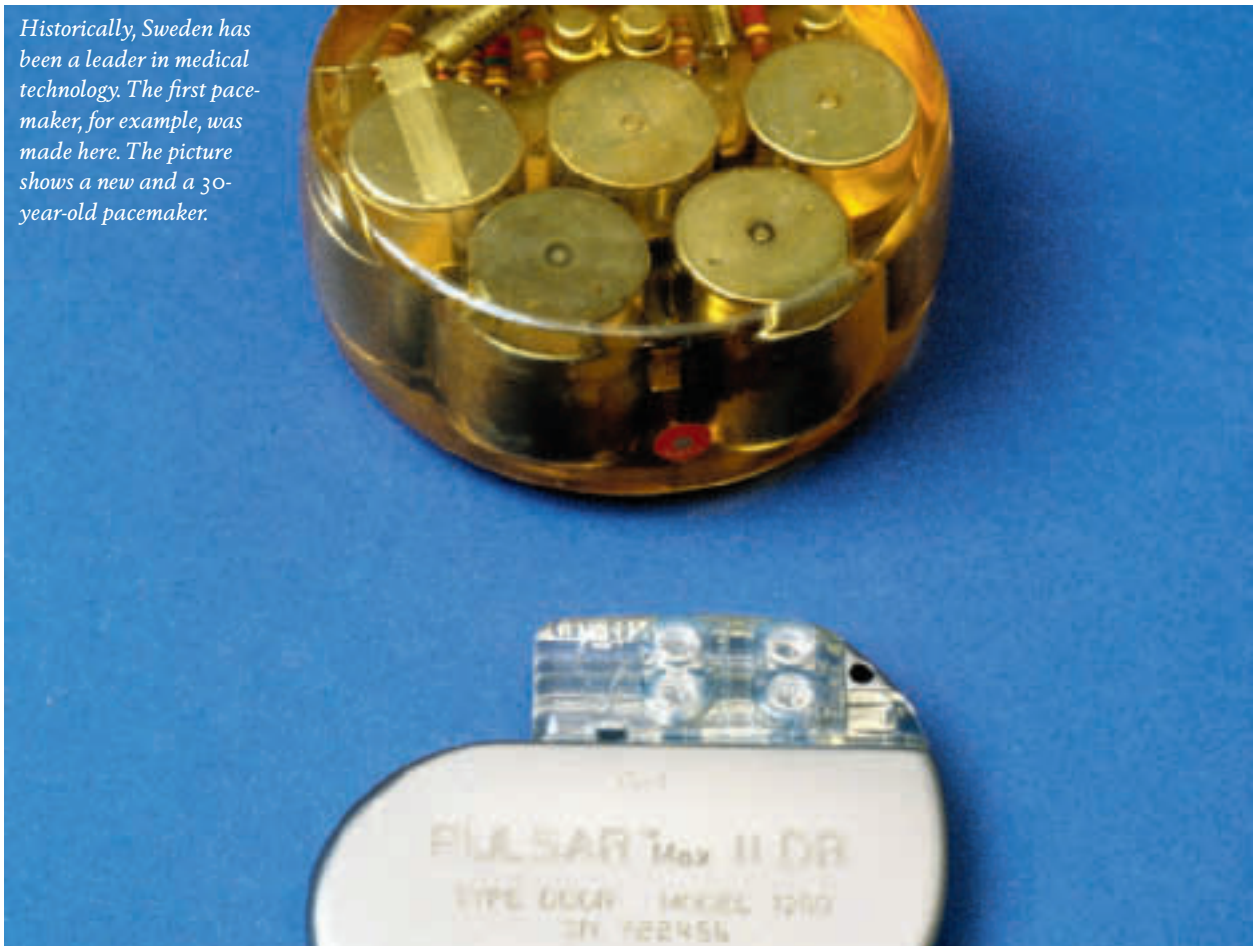
In spring 2006, jointly with the Swedish Foundation for Strategic Research (SSF) and the Swedish Agency for Innovation Systems (VINNOVA), the Swedish Research Council made a major investment in medical technology research. A total of SEK 81 million was awarded to five interdisciplinary research groups and three young researchers.

This initiative is based on an evaluation showing that, for Sweden to hold its own in international competition, this research field needs more interdisciplinary approaches and stronger ties with clinical practice. In the expert panel's view, research must also be broadened to include molecular medicine to a higher degree. The shortage of career paths, especially for young researchers, was cited as a grave threat to future Swedish research.

The history of Swedish medical technology is studded with successes. Swedish researchers originated such inventions as ultrasound diagnostics, titanium implants, pacemakers, kidney dialysis and gamma knives. And first-class research continues in Sweden. The international experts emphasise, for example, the work under way at Karolinska Institutet's Research Center for Radiation Therapy.

The report *International Evaluation of Swedish Research in Biomedical Engineering* may be downloaded from www.vr.se. *

PHOTO: RESEARCHERS/IBL



Historically, Sweden has been a leader in medical technology. The first pacemaker, for example, was made here. The picture shows a new and a 30-year-old pacemaker.

ATOMIC HOUSEBUILDING

Xiaodong Zou

PHOTO: SIV ENGELMARK CEDERBORG

BY SIV ENGELMARK CEDERBORG

Chemistry researchers at Stockholm University are building minute 'houses' a few nanometres across, with 'walls' of atoms and 'rooms' that can be used to sieve molecules. They have now received Berzelius Centre grants for the next ten years, to develop new, porous materials.

Two nanometres, or two-billionths of a metre: that's the diameter of the pores, or cavities, in the crystals being built by the chemistry researchers at Stockholm University. And it's just the right size for sifting molecules through.

"We're building the crystals like little houses. The walls consist of inorganic building blocks set in place round other chemical compounds. The compounds are then carefully burnt away, leaving cavities behind," says Xiaodong Zou.

New tools for chemists

Xiaodong Zou is a Professor of Structural Chemistry at the University, and head of the new Berzelius Centre for Porous Materials. Her group is at the absolute cutting edge of research in the field. They are the first in the world to succeed in building porous crystals with cavities about two nanometres across, and this opens up completely new areas of application for the crystals.

They can be used for separating molecules or become new catalysts that speed up or control a chemical reaction. Chemists can then manufacture substances that have been impossible for them to make before, or steer reactions so that they obtain substances in the form they wish.

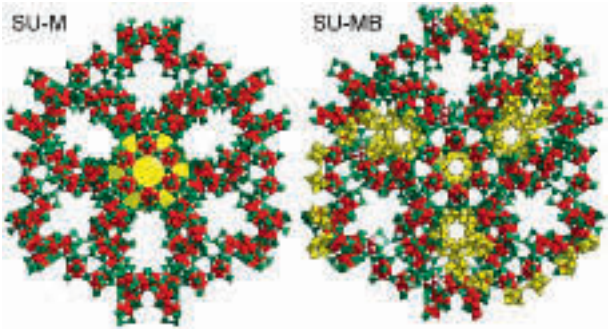
This is an area that the researchers at the new Berzelius Centre are going to examine closely. Chemists from various fields will collaborate to develop new porous materials known as 'zeolites'. Together, the Swedish Agency for Innovation Systems (VINNOVA) and the Swedish Research Council will give the Centre SEK 100 million over ten years. The University, the Institute for Surface Chemistry (YKI) and industry will contribute another SEK 70 million.

Xiaodong Zou, the research centre's coordinator, expects to be able to appoint 15 people.

"Concerting our efforts means a tremendous lot to research on zeolite-based materials, the Department and the University. Now we're also going to use organic materials as building blocks. This gives us much greater opportunities and makes it easier to bind new substances in the cavities," she says.

Xiaodong Zou came to Stockholm from Peking University in 1987 to get a doctorate in electron crystallography. She remained in Stockholm and married her supervisor. They now have three children.

"We've no intention of moving to China, although I'd like to imagine it as a realistic prospect. But I have lots of collaborative projects with China, and I'm working to establish more." *



Pore structure and ducts in a porous material. The red side faces the cavity and the green the framework — the walls. In the crystal on the left, there are two ducts that are mirror images of each other. In the one on the right, one of the ducts is filled.

Read more about Berzelius Centres on page 35.

Particles with high and equal charges attract each other. That causes cement to harden and become concrete. Hands in concrete, designed by Annica Danielsson-Almén.
PHOTO: ÅSA SJÖSTRÖM/SCANPIX SWEDEN

STRONG RESEARCH ENVIRONMENT SCRUTINISES WEAK BONDS

BY SIV ENGELMARK CEDERBORG

Temporary bonds between molecules cause both cement to harden and DNA to be packed into chromosomes. Now ten chemistry researchers in Lund will study these weak bonds more closely.

The porridge-like mixture of cement, water and sand in a cement mixer is filled with vast numbers of nanometre-sized particles with a strong negative charge. With equal charges they should, of course, repel one another. But they do not. If the particles are highly charged enough, an attraction arises instead. And this is precisely what happens when cement hardens, making concrete.

Behind this groundbreaking discovery, which is known as 'ion-ion correlation', are chemistry researchers in Lund.

"It's a fundamental discovery that can be explained by molecular interaction," says Håkan Wennerström, Professor of Physical Chemistry at Lund University.

Professor Wennerström belongs to a group of ten researchers at the Chemistry Department in Lund who have received Linnaeus Grants of SEK 7.5 million over ten years. The intramolecular interaction they are studying gives both materials and living cells their properties, and is fundamental to much of Applied Chemistry.

"The biological applications are endless. Research is important too, for technical questions relating to foods, paper pulp, hygiene products and drug formulae," says Håkan Wennerström.

The bonds between the molecules are temporary and easily broken. In the interaction, functions and interesting scientific phenomena arise that the Lund researchers will study more closely.

"Understanding what's fundamental is a challenge to understand. The same subtle electrostatic mechanism underlies the hardening of cement, and when DNA packs itself into chromosomes," states Håkan Wennerström.

The researchers use quantum chemistry and computer simulations to calculate the strength of the bonds. Experiments on model systems then show whether the theories are workable, whereupon the results are used to solve concrete problems.

The chemistry environment at Lund University has assembled ten researchers in Theoretical, Physical and Biophysical Chemistry who have been collaborating for some time. This collaboration has resulted in a large number of acclaimed scientific articles.

Håkan Wennerström
PHOTO: T. BUSCH-CHRISTENSEN

"We have a research community that is governed by stimulation and encouragement," says Professor Håkan Wennerström. ✱

Read more about Linnaeus Grants on page 34.

FAILING MEMORY A PORTENT OF ALZHEIMER'S

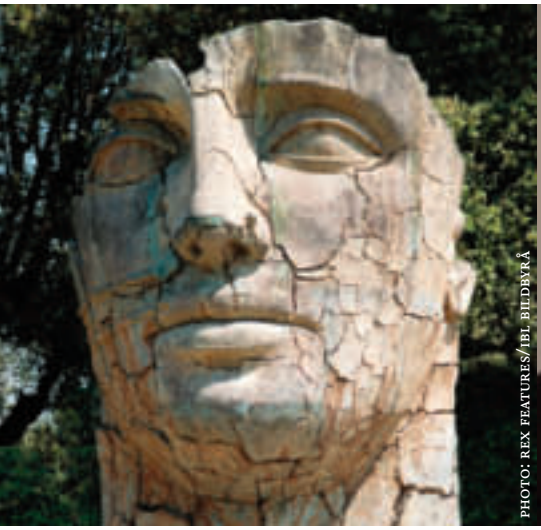


PHOTO: REX FEATURES/IBL, BILDBYRÅ

Lars Bäckman

PHOTO: ULF SIRBORN

People's memory for words and faces starts to deteriorate nine years before the actual onset of Alzheimer's disease.

BY THOMAS HELDMARK

In future Alzheimer's patients, the memory for words and faces starts to fail as early as nine years before the first signs of the disease become apparent. Lars Bäckman, a psychologist, has identified early changes in the brain's memory structure that trigger the ageing-related disease, which destroys central memory functions and erases a person's life history and identity.

In a series of studies, Lars Bäckman, Professor of Psychology at the Department of Neurobiology, Care Sciences and Society at Karolinska Institutet, and his colleagues have been testing memory, mental alacrity, power of observation and spatial ability in more than a thousand people from the age of 75, over 12 years.

One key conclusion from the project is that people's memory for words and faces starts to deteriorate as early as nine years before the actual onset of Alzheimer's disease. During this initial period, no neurological signs of the disease are visible.

Since the finding is at group level it is impossible, on the basis of these studies, to predict whether an individual will get Alzheimer's. In individual cases, a failing memory may be due to everything from mild depression to inadequate social contact or high blood pressure. Lars Bäckman has also found that high rates of social or intellectual activity appear capable of delaying the onset of Alzheimer's.

Dopamine level crucial

Dopamine acts as an essential lubricant not only for the brain's motor functions but for memory and cognitive functions as well, as Lars Bäckman's previous research has shown. In his latest project, he is investigating the impact of losses in the dopamine system on the cognitive problems that arise as a normal part of ageing.

"The older we get, the more our dopamine levels fall, and that's one of the factors that makes our memories worse and our thinking slower — not ageing as such," Lars Bäckman relates. ✱

WORLD LITERATURE SEMINAR

Is literature a European creation? If not, why does France take up more space in overviews of literary history than India, with its much richer treasury of texts?

This question was posed at a recent seminar on *Literature in the World — Reading as a Key to Other Cultures*. The discussion focused on Eurocentrism in literary history research, and on ways of departing from this norm.

According to one of the participants, the French literary researcher and critic Pascale Casanova of CRAL (*Centre de Recherche sur les Arts et le Langage*) in Paris, writers have been engaged in a global struggle for recognition ever since the 16th century. This trend was most pronounced in the late 19th and early 20th centuries, when Paris and London emerged as two powerful centres exerting massive influence on estimation of literary value.

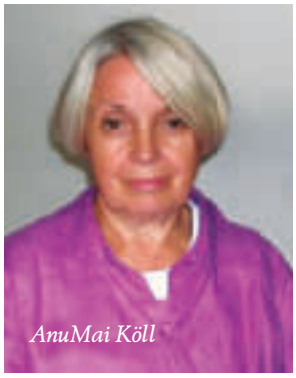
The seminar, held at the end of January, was part of the 'Quarterly Seminars' series initiated by the Swedish Research Council's Scientific Council for Humanities and Social Sciences in spring 2006. Other seminars have dealt with survey investigations, social healing processes, democracy research and archaeology.

"Our aim, with this seminar series, is to spread knowledge of research in the humanities and social sciences that has — or will come to have — a major bearing on our society," says Arne Jarrick, Secretary General for Humanities and Social Sciences. ✱

EXPULSION OF KULAKS A SORE IN ESTONIAN HISTORY

BY THOMAS HELDMARK

After the Second World War, more than 10,000 Estonian farmers were driven off their land, often by their neighbours. On the spot, the historian AnuMai Köll has studied the largest wave of deportations in the Baltic region. She has done so through the eyes of the local perpetrators.



AnuMai Köll

PHOTO: SOCIETY AT SÖDERTÖRN UNIVERSITY COLLEGE

The Soviet regime called them *kulaks*. They were wealthy farmers, the bourgeoisie of the peasant class. Originally, the word 'kulaks' denoted influential farmers who owned a great deal of land and thereby threatened the revolution. In the years 1929–32, a massive purge of the kulaks took place throughout the Soviet Union. Those who were not captured or killed might be seen wandering around as vagrants in Siberia.

After the war, a similar purge took place in the states annexed by the USSR. In the Baltic region, the notion of 'kulaks' was extended to include anyone who had ever employed a stable boy. Kulaks, then, included single women whose husbands had died in battle and who therefore obtained help with the harvest, and elderly couples who were unable to cope with their farms unaided.

"An astonishing number of weak families were driven off their farms," says AnuMai Köll, who is a Professor of Baltic History, Culture and Society at Södertörn University College.

Whole community joined in

People who collaborated with the Germans were also at risk of being dubbed 'kulaks'. During the German occupation, many Russians were taken prisoner. The Russian prisoners of war were then put to work on Estonian farms. And using Red Army soldiers as free labour was frowned on by the Soviets.

The basis of the system was the idea that the whole community should join in the expulsion campaign. The local governments and villages were ordered by the central administration to draw up lists of kulaks in their areas. All the villagers were supposed to attend the meetings and add their signatures to the lists. Those who held back were named and shamed.

"The kind of guilt people presumably felt about singling out their neighbours does untold damage to a society. That was a painful chapter in Estonia's history. I feel I can sense it when I visit the villages and talk to the elderly inhabitants."

Letters testify to the purge

AnuMai Köll has studied the campaigns, on the spot in Estonia, in three villages near the town of Viljandi. She has been digging in the local archives and the archives of the Communist Party in Tallinn.

She is struck by how well-documented the campaign was. Thousands of documents and letters relate how smallholders were driven away, how they lost their civic rights and how some were killed. Here, there are also numerous letters of appeal.

What affects her strongly is the fact that the local people, mostly without intending to do so, might become involved as perpetrators. There is a copious stock of letters in which people attempted to defend those who had been identified as kulaks.

"In those letters, the reasoning went like this: 'It's all very well getting rid of the kulaks, but these particular people, or this family, aren't kulaks.' "

Anyone could be affected

Those who pushed hardest for the anti-kulak campaign were the local leaders who had most enthusiastically fended off the Nazis during the German occupation,

Anyone could be affected, in AnuMai Köll's view. The meaning of the term 'kulak' changed constantly. The victims and the perpetrators were interchangeable, and that generated a paranoid atmosphere in the villages, she relates. Outside one's own family, there was no one to trust. *

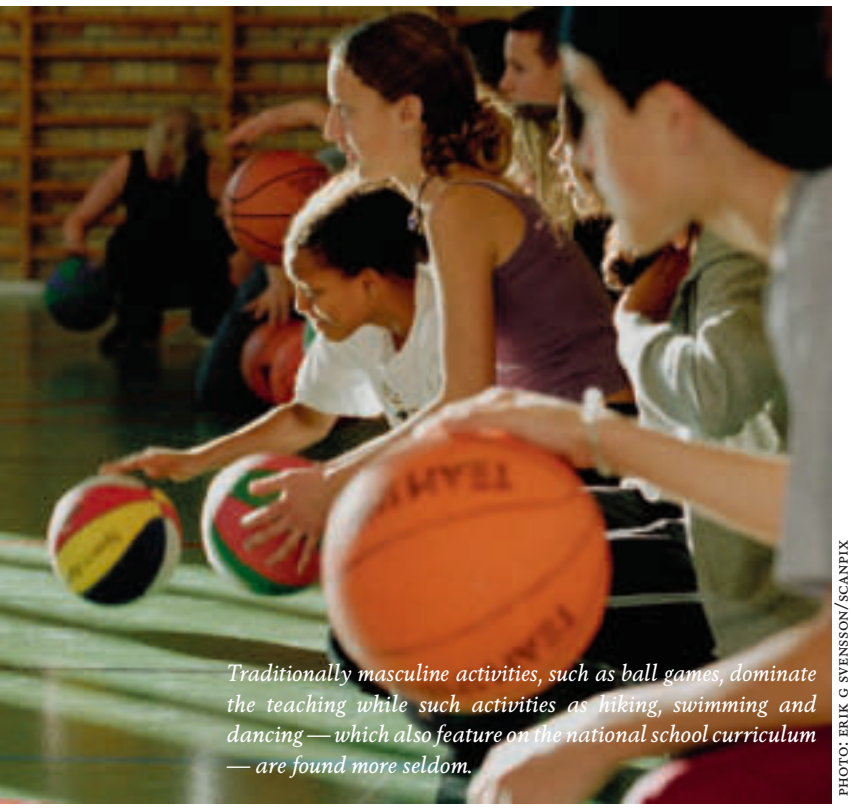
AnuMai Köll has studied the anti-kulak campaigns in three villages near the town of Viljandi in Estonia. The picture is from Viljandi.

PHOTO: LARSERIC LINDÉN/SCANPIX SWEDEN

SCHOOL SPORTS AMPLIFY GENDER DIFFERENCES

BY RAGNHILD ROMANUS

Teaching in the subject of Physical Education and Health is often permeated by traditional notions of masculinity and femininity. It thereby accentuates and even creates gender differences. This was the conclusion drawn by a research team when they studied PE teaching in the upper school years.



Traditionally masculine activities, such as ball games, dominate the teaching while such activities as hiking, swimming and dancing — which also feature on the national school curriculum — are found more seldom.

PHOTO: ERIK G SVENSSON/SCANPIX

What notions of girls' and boys' sporting abilities characterise teaching in Physical Education and Health (PEH)? What is highly esteemed in the subject, and what are the implications for girls' and boys' sporting progress and learning about themselves?

With these questions in focus, three researchers at the Stockholm School of Education and the Swedish School of Sport and Health Sciences (*Gymnastik- och idrottshögskolan*, GIH) set out to study the situation of girls and boys in sports teaching in the upper years of school.

One statement in the general section of Sweden's national school curriculum is that teaching must 'counteract traditional gender patterns'. But the researchers fairly soon discovered that what is esteemed in the subject of PEH is largely the kind of characteristic that is traditionally associated with masculinity. As a result, boys appear to be better at the subject. They also found that girls and boys, as such, were treated as homogeneous groups.

In the debate concerning advantages and disadvantages of coeducation versus sex-segregated education, it has often been assumed that the nature of girls and boys is given — that boys are dominant and girls become subordinated to them. This assumption clearly characterises the activities and forms of work in PEH, in the three researchers' view.

It is the 'girly girls' and the 'boyish boys' that dictate the norm. Boys and girls who do not correspond to the conventional images are ignored.

"Sports teachers develop various strategies for dealing with girls' and boys' disparate conditions in PEH teaching. These strategies are often aimed at making conditions more gender-equal — but they tend, instead, to reinforce the stereotyped gender patterns. No conclusion has been drawn from the fact that girls and boys vary tremendously among themselves," says Birgitta Fagrell at GIH.

Masculine achievements praised

One manifestation of this view of male and female characteristics is the tendency to praise masculine achievements. Accordingly, demands and expectations concerning girls are lowered.

After observing lessons and interviewing teachers and pupils, the researchers grasped with increasing clarity the connections between the images of the 'boyish boys' and 'girly girls' and notions of heterosexuality. Questioning these images means challenging gender patterns and, by the same token, the conventional wisdom about how heterosexual boys and girls interact.

"Perhaps it's changes of this type that have to happen for a new subject to be created — one in which gender has no bearing on the emergence of individuals' favour-able views of sport and their own bodies. If we fail to challenge the foundations of the subject, present-day teaching can go on being a tool for preserving a hierarchic order between masculine and feminine," thinks Birgitta Fagrell. ✱

Other participants in the project are Karin Redelius of the Swedish School of Sport and Health Sciences (GIH) and Håkan Larsson of the Stockholm School of Education and GIH.

PHILOSOPHY WITH CHILDREN NURTURES LAISSEZ-FAIRE MENTALITY

BY RAGNHILD ROMANUS

The purpose of teaching philosophy is to train students' critical thinking. But a study at Stockholm University shows that children taught philosophy have developed a relativism that conflicts with this purpose.

In many parts of the world, children are getting philosophy lessons. There are high hopes that this philosophising will foster pupils' critical thinking. The idea is to help them take sensible decisions and solve problems rationally.

Ragnar Ohlsson, Professor of Practical Philosophy at Stockholm University, has studied the thinking of children who have been taught philosophy in Years 4 and 5. The findings of his study are paradoxical.

"The pupils' ability to argue openly and constructively had improved, it's true. But at the same time they seemed to have developed the kinds of attitudes that appear irreconcilable with critical thought — a form of laissez-faire relativism that sees all answers as equally good. They couldn't even see any essential difference between good and bad arguments, despite the arguing skills they themselves displayed."

Most pupils perceived moral stances and philosophical views as subjective or relative. In their opinion, it was impossible to come up with more or less rational arguments where these issues were concerned.

"Previous studies show similar reasoning in pupils who haven't been taught philosophy. So two years' philosophical discussions don't seem to affect this attitude. This outcome is at odds with the express objective of the philosophy teaching — to enhance the children's capacity to tackle various kinds of problems in a critical, rational way. If all views are held to make equal sense, attempting to use rational argumentation to reach well-founded opinions seems a waste of time."

When it comes to historical or mathematical questions, on the other hand, openness to and tolerance of diverse views appear to have a stimulating effect, Ragnar Ohlsson says. People who have taken part in philosophical discussions, too, are more able to see alternatives and argue about their advantages and disadvantages. But the relativism has not, apparently, spread to these subject areas. Here, statements were perceived as objectively true or false.

Intellectual virtues a better target

For many years, in many countries, 'critical thinking' has been a desideratum in all education. It is emphasised as the key objective of philosophy with children, in particular. But Ragnar Ohlsson thinks the expression is too vague.

"If 'critical thinking' consists in the ability to detect weaknesses in arguments, it's too narrow a goal. Accordingly, more and more ingredients have been added to the mixture, and in the end it's become too obscure to serve as a teaching aim."

Instead, Ragnar Ohlsson has started developing a theory in which 'critical thinking' is superseded by the notion of 'intellectual virtues'. Then it becomes clearer that there is no single goal to strive for.

"In teaching geared to attaining intellectual virtues, it should be possible to define various desirable thinking habits, methodological rules and attitudes. Then you can consider, in a more open-ended way, the qualities a wise person should exhibit in various situations. Thereby, you can attain greater clarity but also, perhaps, take note of how various ways of thinking and solving intellectual problems — ways that are intrinsically desirable — may be at variance. Perhaps not all intellectual virtues can coexist in a single individual." *

PHOTO: ANETTE NANTELL/SCANPIX

Ragnar Ohlsson, Stockholm University

NEED FOR ADVANCED COMPUTING RESOURCES

BY ANDERS NILSSON

High-performance computers are increasingly needed in more and more fields. Comprehensive computing may be described as the third paradigm of research, alongside the twin classics: theory and experimentation. This is stated in the SNIC survey covering the next three years.

In ever more scientific fields, computer simulations are a key feature of research. Since computers are general research tools, the computer power used in Particle Physics on any given day may, on the next, serve for calculating climate models or demographic variables.

"The development of computers and algorithms means that the power of these tools is growing exponentially. No other research tools come near this kind of growth," says Sverker Holmgren, a researcher in Computation at Uppsala University and Director of the Swedish National Infrastructure for Computing (SNIC).

SNIC's remit is to provide access to high-performance supercomputers and computing resources. Sverker Holmgren emphasises the importance of Sweden playing an active part in establishing European infrastructure in this field.

The SNIC report, *The Swedish HPC Landscape 2006-2009. Visions and Road Maps*, states that the need for high-performance computers has been traditionally associated with Physics, Chemistry and Engineering Sciences, in particular. However, it points out that their use is now growing rapidly in Biology and Medicine, and that there is an incipient interest in the Social Sciences and Humanities. ✱

SNIC functions as an umbrella organisation and comprises the six leading centres for high-performance computer systems in Sweden, which serve Swedish researchers by providing access to advanced computing resources.

SNIC is subordinate to the Swedish Research Council's Committee for Research Infrastructures (KFI). With DISC (the Database InfraStructure Committee) and the Swedish University Computer Network (SUNET), it forms the basis for Sweden's e-Science infrastructure.

Read more and download SNIC's reports at www.snic.vr.se.

PHOTO: MAXIMILIEN BRICE/CERN

When the Large Hadron Collider (LHC) accelerator starts at the CERN laboratory, a massive increase in datastorage, computing power and processing will be required. The picture shows the insertion of the ATLAS semiconductor tracker into the transition radiation tracker.

E-SCIENCE IMPROVES QUALITY

How can e-Science aid research? This was the question that leading e-Science experts discussed at a seminar, organised by the British Embassy in Sweden and the Committee for Research Infrastructures at the Swedish Research Council, in Stockholm in February 2007.

E-Science, such as networks, databases and computing resources, offers new approaches to conducting research and facilitates work in a multitude of areas with exceptionally high requirements for data storage and processing. E-Science also eases interdisciplinary interaction, as well as interaction between scientists in distant geographical locations.

The increased need for interaction and access to data has made the development of a functioning grid structure an extremely relevant issue. Many people at the seminar spoke of the need for commitment and strategies to maintain a stable infrastructure. The benefits of face-to-face discussions were pointed out; it is laying the groundwork for common understanding and operability that takes time.

Juni Palmgren, Chair of the e-Science group in the Committee for Research Infrastructures sees great potential for various forms of cooperation between the UK and Sweden in the future.

Read more at www.vr.se. ✱

UMEÅ GETS A NATIONAL MOLECULAR MEDICINE CENTRE

The Swedish Research Council is granting SEK 77.5 million for a new laboratory for Molecular Medicine at Umeå University. The laboratory is to focus on Molecular Infectious Medicine. At the laboratory, scientists in the fields of Microbial Molecular Pathogenesis, Chemistry, Structural Biology, Physics, and Chemical Genetics have joined forces. Their aim is to study human infectious diseases at the molecular level. Hopefully the new results can lead to better treatment of infections and be applied to the production of new drugs and vaccines.

The purpose of this new initiative is to strengthen Swedish research and enhance dynamism in the field of Molecular Medicine, by such means as promoting young researchers' career opportunities. Besides the total of SEK 77.5 million that the Swedish Research Council will disburse during 2007–10, Umeå University will contribute some SEK 90 million. ✱

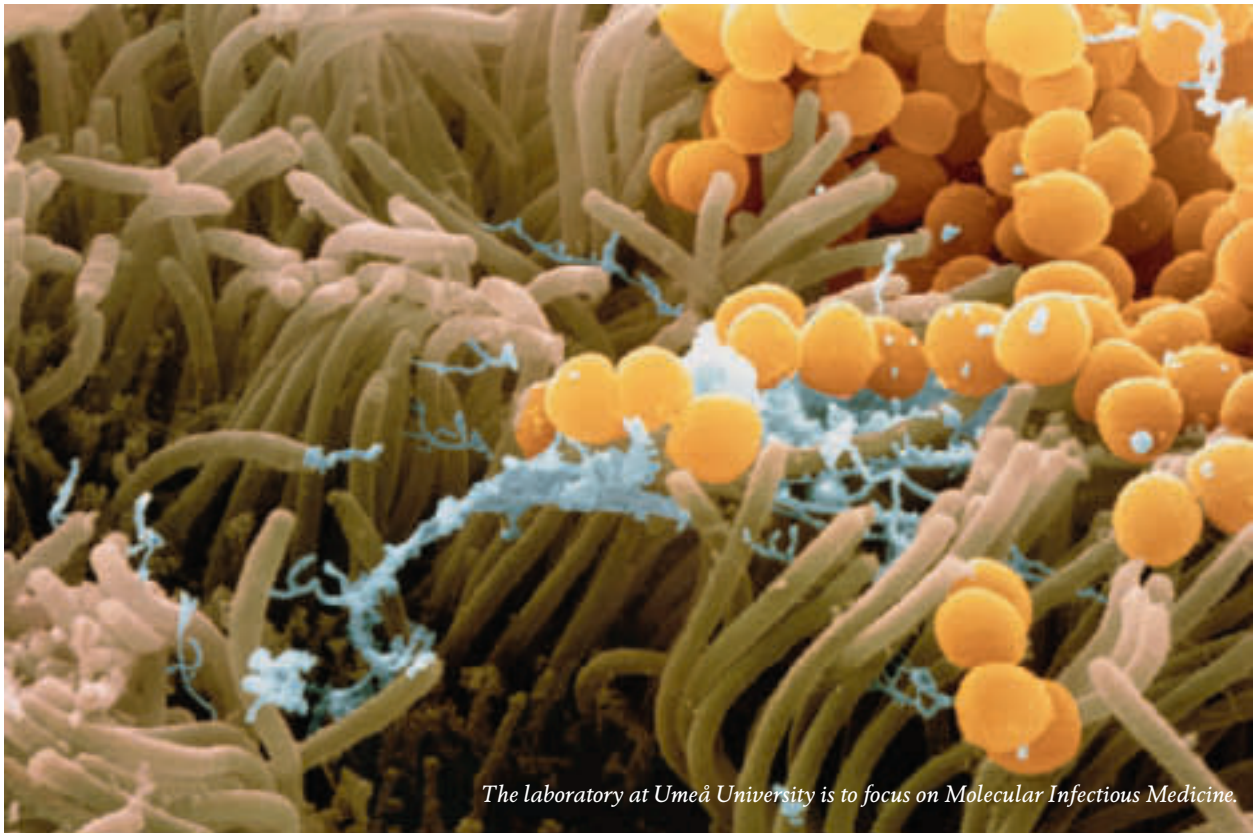


PHOTO: SCIENCE PHOTO LIBRARY/IBL

The laboratory at Umeå University is to focus on Molecular Infectious Medicine.

SWEDEN OFFERS TO HOST ESS

The Swedish Government has decided that Sweden should offer to act as host to the European Spallation Source (ESS). Allan Larsson, who has previously investigated the scope for the ESS to be located in Sweden, has now been charged with working for the establishment of this research institution near Lund.

Allan Larsson estimates Sweden's chance of hosting ESS as 50%.

"It's a matter of economics, politics and law, and Europe has to agree. Lund already has a broad, strong research environment with such establishments as MAX-lab (the National Electron Accelerator Laboratory) at Lund University."

The plan is for the ESS to become the world's most powerful neutron source for research in Biology, Nanotechnology, Energy Technology, Materials Science and Engineering Sciences. Using neutrons, the structure and functioning of all types of materials, from steel to proteins, can be explored.

"The European roadmap for pan-European infrastructure and also the Swedish equivalent — *The Swedish Research Council's Guide to Infrastructure 2006* — give high priority to the ESS. With the Government's decision, we can carry on planning for how the ESS can foster Swedish and European research as much as possible," says Lars Börjesson, Secretary General of the Swedish Research Council's Committee for Research Infrastructures. ✱

THE SWEDISH RESEARCH COUNCIL'S GUIDE TO INFRASTRUCTURE — A ROAD-MAP FOR FUTURE RESEARCH

PHOTO: RAGNAR NESS/IBL

How climate data collected by various organisations, institutions and agencies should be coordinated and managed in such a way as to be available to researchers is a question that was discussed during work on ***The Swedish Research Council's Guide to Infrastructure****.*

BY CAMILLA JAKOBSSON

Needs and priorities for research infrastructure must be considered in the long term. The Swedish Research Council has therefore drawn up Sweden's first long-term plan for research infrastructure. A similar roadmap has been issued at European level.

Modern research often calls for access to advanced laboratories, major databases or powerful computers for various operations. These represent major investments, which must frequently be made across national borders to enable the projects to be managed cost-effectively. But the larger these initiatives are, the further in advance the investment and use of the infrastructure needs planning. Accordingly, in October 2006, the Swedish Research Council presented Sweden's first long-term plan for research infrastructure, covering the next 10 to 20 years.

"The key aspect of the Research Council's guide to infrastructure is, I think, that it provides a coherent picture of the inputs required for Swedish researchers to obtain the most outstanding tools for future cutting-edge research," says Madelene Sandström, Chair of the Council's Committee for Research Infrastructures (KFI).

It was KFI that drew up the Swedish infrastructure guide. The primary recommendation in the report is to complete the establishment of infrastructures that have already been decided upon. A few scientifically robust projects that will soon require decisions on Swedish participation are also identified. These include two facilities for advanced material and biomolecular studies: the European Spallation Source (ESS) and the MAX IV Synchrotron Light Facility, for each of which a Lund location is proposed, and two joint European facilities, the Free-electron Laser XFel and Facility for Antiproton and Ion Research, FAIR.

"The new research facilities can't be seen solely in national terms. Very often, they involve very costly investments in advanced infrastructure that can cover the needs of the research community throughout Europe, or even globally," says Lars Börjesson, Secretary General of KFI.

The report also identifies a number of areas where the aim is that improved infrastructure will bring about better scope for world-leading research. Co-ordination of biobanks, polar research and digitisation in the Humanities are examples of areas that will be examined more closely.

European Roadmap

At European level, the European Roadmap for Research Infrastructures has been drawn up within the *European Strategy Forum on Research Infrastructures* (ESFRI). This report, too, was published in October 2006. One priority given particular emphasis in the European Roadmap is greater efforts, both in the research community and at policy-making level, to resolve energy issues.

The two documents supplement each other, says Lars Börjesson, who took part in work on both the Swedish and the European roadmaps.

"Since the European proposals are on such a large scale, Sweden can only join in a few of the initiatives. So we have to weigh up the various infrastructures and decide which of them represent the most added value for Swedish research. We expect a lot of input from the research community for the revised version of the infrastructure guide, which we're planning to complete by summer 2007."

An English version of the guide has been published. *The Swedish Research Council's Guide to Infrastructure, Summary 2006* is available on order or can be downloaded at www.vr.se.

For the *European Roadmap for Research Infrastructures*, go to http://cordis.europa.eu/esfri/home.html. ✱

ENCOUNTER BETWEEN ART AND SCIENCE A COLLISION

BY JESSICA RYDÉN

The encounter between researchers and artists has not culminated in a distinctive, coherent set of scientific methods. This is the finding of the Nordic expert group that has scrutinised five years' support for the area of artistic R&D. It is high time, the experts write in their report, we abandoned the view that artistic research arises in the interface between art and science.

How 'artistic research' should be defined is a longstanding topic of debate among artists, fund providers and researchers. Can artists, by reflecting on the creative process, generate their own 'scientific' methods? Or are artists assumed to learn from other disciplines — that is, is artistic research an academic discipline in its own right, or a field of research among others in the Humanities? The various views held have implications for the allocation of funding and the best ways of supporting methodological development.

The discussion was intensified in 2001, when the Swedish Research Council was instructed by the Government to allocate funds to artistic R&D and encourage academic progress in the field. The Research Council then opted to award grants to networks and projects involving collaboration between representatives of a university college of fine arts, on the one hand, and a scientific institution outside the world of art on the other. In this manner, it was hoped, researchers with established scientific methodology would contribute to the development of artists' reflections into something that might be termed 'research work'.

Searing criticism

Between 2001 and 2006, the Research Council awarded a total of SEK 15 million for artistic research. The report evaluating this initiative is simultaneously a searing critique of the distribution and use of these funds and a defence of artistic research. The conclusion is that the initiative has not yielded the desired results.

The development of methods has been too slow; documentation has been inadequate; and the working methods have produced meagre results. So write the evaluators. At the same time, they see great potential in the field and propose a range of measures for making artistic R&D an independent, strong academic discipline. A 'University of the Arts' in Stockholm is one proposal; an earmarked annual budget for the field and better coordination of the funding are others.

No special treatment

According to the evaluation, to develop in the best way artistic R&D must be given a more independent role vis-à-vis other research fields. If the funding is to be managed by the Swedish Research Council, the funds must be distributed by a body with the same status as the Council's Committee for Educational Sciences.

However, the Research Council has chosen to allocate funding for artistic research in 2007 in line with proposals from an evaluation group within the scope of the Scientific Council for Humanities and Social Sciences.

"It must be possible for artistic research to hold its own in the competition on the same academic terms as other research fields," comments Arne Jarrick, Secretary General for Humanities and Social Sciences. *

PHOTO: CECILIA MELLBERG

Several of the projects funded by the Swedish Research Council have been highly acclaimed in the media. 'A Millennium with God — A Second on Earth' ***(Tusen år hos Gud — en sekund på jorden)****, produced by Margaretha Åsberg, a Professor of Dance, is one example. In this production, researchers, actors and danc-ers gave expression to questions of human existence.*

FIRST CALL FOR LINNAEUS GRANT APPLICATIONS

BY THOMAS HELDMARK

At the end of June 2006, selection of the 20 research environments that will receive Linnaeus Grants took place. Immigration and integration, research on education and learning, nanoscience, demographic studies, materials research, stem cells and climate research are some of the subjects that are to be studied. Altogether, these environments will share a total of SEK 140 million over the next ten years.

The objective of the Linnaeus Grant is to improve support for research of the highest quality that is capable of competing internationally. Another aim is to induce higher education institutions (HEIs) to set priorities among research fields and allocate their funds accordingly.

Of the 106 applications received, 20 resulted in support for the environments concerned. Eight of these come from Lund University. The remainder, too, come from the older universities.

The call was an assignment given to the Research Council for Environment, Agricultural Sciences and Spatial Planning (Formas) and the Swedish Research Council under the Government's Research Policy Bill of spring 2005. The time frames were so narrow that both the research-funding agencies found themselves obliged to start work on the calls even before the Riksdag (Swedish Parliament) had taken its formal decision on support. These funds were, under the Bill, to be distributed as early as possible in 2006.

The forms of the call for applications were devised in a dialogue with HEIs. Being an entirely new form of support, the Linnaeus Grant called for entirely new routines. A sum of SEK 140 million was to be awarded to strong research environments. The Government's directive stated that the HEIs, not individual researchers, should apply for the funds. The support was to last ten years. The applications are assessed by eminent international researchers.

At short notice, hundreds of experts were sought in the fields covered by the applications. A total of 250 external reviewers were engaged, along with members of four subject-specific panels and a general panel that took the final decisions. The objective was that each individual application should be examined by three international experts, whose task was to consider its scientific quality and scope for scientific renewal. Geographical dispersion was not to be considered in the allocation of funds.

Björn Wittenmark, Lund University

Ylva Dandanell Daveby, Växjö University

Olaf Svenningsen, Uppsala University

PHOTO: ANDERS NORDERMAN

Lack of feedback

To share experience before the next call for Linnaeus Grant applications, some 40 vice-chancellors, heads of department and other HEI representatives were invited to a seminar in Stockholm at the end of August 2006. The Swedish Research Council's Director General, Pär Omling, hosted the meeting.

Several of the seminar participants were concerned that such a high proportion of the assessors were foreign experts. What detailed knowledge do they have of Swedish research structure and environments? The assessor panels should make site visits, one purpose being to obtain a correct notion of the infrastructure, some people thought.

Jan-Otto Carlsson, Vice-Rector at Uppsala University, considered that international reviewers are superior when it comes assessing quality of projects and research renewal. Nevertheless, he thought they had difficulty in assessing criteria concerning gender equality or the HEIs' basic financial capacity and organisation.

Criticism was directed at the call for applications on the grounds that extremely few women had been awarded grants. Admittedly, few women were included in the applications: only 21%, against 79% men. But once the money had been distributed the women's share had fallen further, to 16.3%.

One oft-expressed wish was that the whole process should be made more transparent. The lack of feedback was also cited. True, the external reviewers issued written assessments that were passed on to the HEIs, but there was no written material for providing feedback from the subject-specific panels or the general panel. Since feedback is necessary to enable people to come back with better applications, this should be remedied by the next round of applications, several people considered.

Stiff competition

Several seminar participants confirmed that the actual selection process had exerted a highly beneficial impact on the HEIs. Research teams have forged contacts and environments have been created that will persist, among all those who did not receive grants as well as those who did. What's more, HEI management teams have gained a valuable insight into the research potential at their own institutions.

Lena Gonäs, Dean at Karlstad University, emphasised the fact that none of the younger HEIs had received any funds. She wondered what the cause might be and whether it was at all worthwhile for a small HEI to spend half a man-year developing one or more environments.

Pär Omling, the Swedish Research Council's Director General, declared that competition in this initial round was particularly stiff, since so many outstanding environments at the old, established universities were applying at the same time.

"When we've implemented a call like this once or twice more, let's hope environments from other institutions will also get into the running," said Pär Omling.

A call for applications for Linnaeus Grants was issued for the second time in May 2007. ✱

Read the article 'Strong research environment scrutinises weak bonds' on page 25.

PHOTO: ANDERS NORDERMAN

Bengt H Olsson, the Swedish Research Council for Environment, Agricultural Sciences and Spatial Planning (Formas)

Jan-Otto Carlsson, Uppsala University

Lena Gonäs, Karlstad University

FOUR BERZELIUS CENTRES

Four strong research environments, in Stockholm, Uppsala and Umeå, are the first Berzelius Centres.

Under a decision taken at the end of September 2006, the Swedish Research Council and the Swedish Agency for Innovation Systems (VINNOVA) will jointly grant a total of up to SEK 100 million to each Centre over a ten-year period. Including cofunding from the HEIs, the business sector and the public sector, each Centre will have a total budget of some SEK 170 million.

As a form of support, the Berzelius Centres grants cater for environments that conduct excellent basic research and have a clear ambition to develop their collaboration with the business and public sectors. The long-term objective is to make research useful through commercial applications.

The Swedish Research Council and VINNOVA received 22 applications for this form of support. The Berzelius Centre initiative was an assignment received by the two funding agencies under the Government Research Policy Bill of spring 2005. ✱

Read the article 'Atomic housebuilding' on page 24.

SWEDISH GENDER RESEARCHERS GO EUROPEAN

BY RAGNHILD ROMANUS

Swedish gender research should undergo internationalisation. With this end in view, in spring 2006 the Swedish Research Council issued a call for funding applications for strong environments in this field. In November three environments were nominated as Centres of Gender Excellence. One of these is a collaborative venture involving Linköping and Örebro Universities. The other two environments are based at Uppsala and Umeå Universities.

The idea is that the three Centres of Gender Excellence should serve as focal points in European gender research. The Swedish Research Council will distribute a total of SEK 60 million: each of the three selected environments is to receive SEK 4 million a year over a five-year period.

Applications for nomination as Centres of Gender Excellence have been examined by some of the most eminent international researchers in the field of gender research. Innovation and concrete plans concerning how to take an international lead in the field were the key selection criteria when these environments were selected.

Marian Simms — Chair of the assessor panel and Professor at the Political Studies Department, University of Otago, New Zealand — relates that she and her colleagues on the panel were impressed by the quality of the applications, and agreed unanimously on which environments should be funded. Their impression is that Swedish gender research is highly advanced, while at the same time lacking international ties. Marian Simms stresses the importance of international exchange.

"You have to get published in English, so that we outside your linguistic area can benefit from your research!"

Ever since its foundation, the Swedish Research Council has allocated SEK 10 million a year to gender research, these funds being earmarked by the Government. The Government's Research Policy Bill of 2005 provided an increment of SEK 7.5 million for 2007 and another SEK 4.5 million for 2008. The Research Council has opted to invest these funds in strong research environments in the field.

Survey of infrastructural needs

With the nomination of these strong environments, the Swedish Research Council decided to conduct a survey in 2007 to establish requirements for investments in infrastructure in the field of gender research. Marian Simms is enthusiastic about this development and emphasises how existing databases can be supplemented by material that may serve as the foundation for gender studies in new fields. One example she pinpoints is a database in which official material, such as speeches and letters, is supplemented by private notes and correspondence.

"Extended databases of this kind provide an interesting supplement to our current picture of various historical leaders, both women and men."

The following environments have been selected as Centres of Gender Excellence:

Britta Lundgren, Umeå University: *Challenging Gender — an Umeå research programme in advanced gender studies.*

"Basing our work on previous gender research in democracy and social justice, emotions, violence, health and normalisation, we seek to develop cross-disciplinary gender research further in international collaboration."

Nina Lykke, Linköping University in collaboration with Örebro University: *Gendering EXcellence* (GEXcel).

"By gathering eminent gender researchers from different countries, disciplines and areas of knowledge, we aim to create a centre where research broadly transcends disciplinary boundaries and clarifies central issues in gender research from several points of view."

Margaretha Fahlgren, Uppsala Centre for Gender Research: *Nature/Culture Boundaries and Transgressive Encounters.*

"Our aim is create a research environment for gender studies that is strong in international terms, with a focus on interdisciplinary encounters between nature and culture in research, theory development and teaching." ✱

YOUNG RESEARCHERS AWARDED TWO MILLION EURO

BY RAGNHILD ROMANUS

In the face of stiff international competition two Swedish researchers, Anna Qvarnström and Örjan Carlborg, received EUR 1 million each in the 2005 EURYI Awards.

The prestigious European Young Investigator (EURYI) Awards are distributed to excellent young researchers from all over the world, in every subject area. Their purpose is to enable these researchers to create their own research teams at European research institutions.

When the grant was announced for the third time, in autumn 2005, a total of 457 researchers applied through national funding agencies in the 16 countries taking part in the call for applications. In a rigorous process of scrutiny, each country selected a number of candidates proportional to its respective funding contribution. In the second phase their applications were examined by an international panel. In July 2006, the names of the 25 award recipients — each granted €1 million, spread over five years — were announced.

Two recipients were from Uppsala University in Sweden. One was Anna Qvarnström, a senior lecturer in Zooecology at the Evolutionary Biology Centre. The other was Örjan Carlborg, a senior lecturer at the Linnaeus Centre for Bioinformatics, which is jointly run by Uppsala University and the Swedish University of Agricultural Sciences (SLU).

Flycatchers and chickens

Anna Qvarnström's research is about how individuals belonging to different species avoid mating with one another, and why problems usually arise if this mating occurs.

The research group's model system comprises the Pied Flycatcher and Collared Flycatcher, which compete for the same territories on the islands of Öland and Gotland. Studies have shown that heterospecific pairing between the two species, known as *hybridisation*, sometimes occurs. The individuals then enter a biological cul-de-sac: either the hatchlings born are sterile or their fertility is greatly reduced.

"By showing which behaviours result in hybridisation, we can draw general conclusions on the characteristics that normally serve as reproductive barriers," says Anna Qvarnström.

Investigating why genes from different species fail to function properly together is another part of the study.

"When we know that, we can draw key conclusions on how genes normally act in concert to give rise to individuals who can, in turn, reproduce."

Örjan Carlborg's research is about how our genes interact to govern such characteristics as, for example, growth, appetite, obesity and the immune system. In studying two different chicken populations that differ extremely in size, his research group has discovered a new gene mechanism that explains why their growth rates diverge so widely. This discovery has already created a great stir, and it may eventually serve as the foundation of new drugs against cardiovascular diseases and diabetes.

"It will be a long time before our research culminates in new medicines, but with this five-year support we've got a chance to really show how useful our domestic animals are for studying the genetics underlying prevalent diseases," says Örjan Carlborg. ✱

FACTS

The EURYI Awards were instituted by EUROHORCs, an umbrella organisation, in collaboration with the European Science Foundation (ESF). In Sweden, the Research Council for Environment, Agricultural Sciences and Spatial Planning (Formas) and the Swedish Research Council are responsible for the call for applications. There was a new call in autumn 2006, and the forthcoming decisions will be taken in July 2007.

Anna Qvarnström and Örjan Carlborg from Uppsala University in Sweden received EUR 1 million each in the 2005 EURYI Awards. For EURYI Award applicants, one requirement is that at least two and not more than eight years must have passed since the award of the applicant's PhD.

PHOTO: BJÖRN ULLHAGEN

RESEARCH GAINS FROM OPEN ACCESS

BY ANDREAS NILSSON

Findings that stem from publicly supported research should be universally available. On this principle rests the steadily growing interest in open access. The Swedish Research Council has signed the 'Petition for guaranteed public access to publicly-funded research results', addressed to the European Commission. Scope is also being explored for inserting in the Council's grant requirements a stipulation that researchers should publish their results in such a way as to make them freely accessible.

In common with a range of other organisations in Europe, the Swedish Research Council signed the aforesaid petition in February 2007. It urges the European Commission to work for free access to scientific information on the Internet, and also to require researchers who receive EU funding to make their results available in open archives not more than six months after publication.

"Signing this petition was a logical consequence of the Research Council signing the Berlin Declaration on Open Access in 2005," thinks Håkan Billig, who is responsible for drawing up guidelines on how research funded by the Council should be published.

Another person engaged in this work is Ingegerd Rabow, who has long been in charge of issues relating to open access discussed by the library management at Lund University. She finds it disturbing that the prices of journal subscriptions have been accelerating while peer review — scrutiny of quality — is often carried out by unpaid experts.

The fact that many journals have switched to electronic publication has not improved matters for libraries, in her opinion. Since they hire the material on licence, a library forced to cut costs risks losing material to which it has previously had access.

"What's more, journals normally get exclusive rights to published articles, since the authors transfer their copyright. Then the free market doesn't function: you can't buy the article more cheaply from another supplier."

Copyright guide

One task facing Ingegerd Rabow is to produce a guide for researchers concerning copyright to their articles. A growing number of universities and researchers are starting to require other publication models, she relates. Higher education institutions are urging their researchers to file their articles in shared open archives. Ever more freely accessible journals of high quality that are published online are appearing. Moreover, several publishers have switched to 'hybrid journals' in which authors can opt to publish their works in a traditional manner or pay a charge and publish according to the principles of open access.

Several studies show that freely accessible articles are cited more, and that scientific findings attract attention more promptly in open journals.

"The infrastructure is expanding. For further development, one vital point now is that research funders are starting to require — not just to recommend — free access to results," says Ingegerd Rabow.

Both she and Håkan Billig make a point of emphasising that open access must not entail a deterioration in quality.

"Obviously, we mustn't compromise on quality. Open journals must have the same scrutiny of articles as the journals in present-day systems," Håkan Billig asserts. ✱

FACTS ABOUT OPEN ACCESS

Research findings published with open access online can be read and downloaded free of charge. Either researchers can file the articles they have already published in large open databases, or they can post them directly on the Internet, in web journals that practise open access.

The Directory of Open Access Journals (DOAJ) now (April 2007) stocks more than 2,640 quality-controlled open journals in various research fields. Soon, hybrid journals will also be searchable on the DOAJ website, www.doaj.org.

Ingegerd Rabow of Lund University is to investigate the scope for the Swedish Research Council for work for Open Access, a system that is ever more widely supported both in the USA and in Europe.

PHOTO: KENNETH RUONA

The Swedish opening ceremony of the International Polar Year took place at the Ice Hotel in Jukkasjärvi, Kiruna.

PHOTO: JAKOB HALASKA

START OF INTERNATIONAL POLAR YEAR

BY CAMILLA JAKOBSSON

International Polar Year (IPY 2007–2008) began on 1 March 2007. The major international inauguration was held in Paris. The Swedish opening ceremony took place in Kiruna, at the Ice Hotel in Jukkasjärvi.

This is the fourth time a Polar Year has been announced — exactly 50 years since the last — and ambitions are high. International collaboration is set to increase, and several disciplines are to be involved. Over 170 research projects, engaging more than a thousand researchers from 60-odd countries, are under way.

Polar research is vital for understanding global climate change and other global geological processes. The seabeds of the Arctic Ocean are historical archives millions of years old that can yield new knowledge of Earth's development. Changes in the global climate are also observed first, and are greatest, in the polar regions.

But these regions are in the news for other reasons as well. In the Arctic, there are abundant energy resources in the form of oil and gas, for example. Several countries are planning actively to start extracting these resources. How this will affect the area ecologically, climatically and, in particular, politically is an important new research field. How are indigenous populations affected by climatic trends and the growing demand for natural resources? For the first time in the history of Polar Years, the 'human dimension' is also being included as a sphere of the international action plan in its own right.

Another key ambition of the Polar Year is to boost knowledge of the importance of the polar regions. Exhibitions, lectures, a website and other outreach activities are therefore planned.

The Swedish Research Council is planning and coordinating the Swedish activities scheduled to take place during The International Polar Year. The Swedish Committee for IPY comprises representatives of public agencies, universities and organisations. The chairman is Sverker Sörlin, Professor at the Royal Institute of Technology (KTH).

Read more at www.ipy.se. *

PREVENTING RESEARCH MISCONDUCT

BY JESSICA RYDÉN

An independent authority is needed to deal with misconduct in the world of research. This is the Swedish Research Council's standpoint. Since 2002, an expert group has been investigating suspected research misconduct associated with the Council.

In Sweden there is no independent body to deal with misconduct in research. Accordingly, the Research Council set up an expert group for the purpose in 2002. The group comprises a lawyer, a secretary and three subject experts. On behalf of universities and other higher education institutions (HEIs), they investigate suspected research misconduct. But the group is not entitled to investigate cases reported by individuals, nor to impose sanctions.

Birgitta Forsman, a senior lecturer in Research Ethics, has been a member of the expert group for four years. She describes its work as a groundbreaking endeavour to prevent research misconduct at HEIs and set precedents for assessing various cases.

"It's the educational impact of our work that matters. There's still great ignorance among many researchers as to what good scientific practice is, though I think we've helped to raise awareness a bit."

Whether this awareness is what has made 'research misconduct' an established concept in the media nowadays or whether increased competition has given a genuine boost to research misconduct is impossible to say, according to Birgitta Forsman. Between 2004 and spring 2007, the group has looked into a total of 10 cases, including plagiarism, theft of findings and distortion of facts. However, Birgitta Forsman is disinclined to comment on individual cases.

"What's interesting is not the exact number of cases we get in a year, or identifying individual researchers, but how the handling of individual cases is helping to bring about a self-remediation system in which the issue of research ethics is constantly kept alive."

Today, anyone who wants to report misconduct in research in Sweden must contact the employer of the person under suspicion, i.e. the vice-chancellor at the university where the researcher works. Gunnel Gustafsson, the Deputy Director General at the Swedish Research Council and head of the Research Policy Analysis Department, thinks this arrangement is problematical in several ways.

"It may be difficult, as an employee, to approach your employer — a person your position makes you dependent on — in this kind of sensitive issue. What's more, the vice-chancellor personally can, purely hypothetically, be accused of scientific misconduct."

According to Gunnel Gustafsson, an independent authority is a suitable way of complementing the universities' own responsibility for investigating misconduct.

"It would mean that every researcher, irrespective of institution, could obtain an equivalent assessment." ✱

FACTS

The question of how misconduct in the world of research should be dealt with was circulated for consultation from the Ministry of Education and Research in spring 2006. The Government's proposal was that HEIs should manage cases involving research misconduct on their own. But both the Swedish Research Council and the Association of Swedish Higher Education (SUHF) recommend placing an independent body in charge of the matter. A joint working group is now exploring conceivable models for an authority of this kind.

ILLUSTRATION: ROBERT NYBERG

One of the cases dealt with by the expert group concerned alleged plagiarism. However, no fixed criteria for defining the nature of plagiarism in research contexts have been adopted yet.

The illustration comes from ***Good Research Practice — what is it?*** *(No. 1:2006 in the Research Council's report series) This book discusses ethical aspects of research and is intended as a basis for reflection and discussion. It addresses researchers, notably research students and their supervisors, in all fields.*

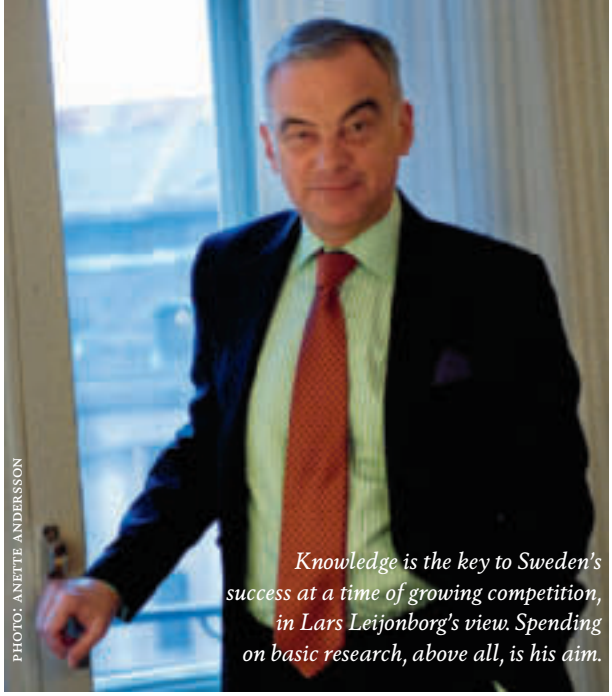


PHOTO: ANETTE ANDERSSON

Knowledge is the key to Sweden's success at a time of growing competition, in Lars Leijonborg's view. Spending on basic research, above all, is his aim.

LEIJONBORG WANTS MORE MONEY FOR BASIC RESEARCH

BY SIV ENGELMARK CEDERBORG

Lars Leijonborg, Minister for Education and Research in the Swedish Government formed by the non-socialist alliance in September 2006, wants to give long-term basic research a larger share of research funding. He also approves of the German model of allocating extra to one or more elite universities.

Alongside his duties as head of the ministry responsible for research and education, Lars Leijonborg is chairman of the Government's globalisation council that was set up immediately after the September 2006 election. In his view, the parts of this twofold function are closely associated, and basic research has a key role in the context.

"Seeking truth and knowledge is part of human nature, and this curiosity leads us forward. That's why research is a way of ensuring that Swedish welfare can be sustained."

Basic research has been neglected in Sweden in recent years, he thinks.

"The great gap is in tax funds for very long-term research and appointments for researchers. That's where we're going to spend most."

More direct grants

What Leijonborg wants is for a higher proportion of research to be funded by means of direct grants to universities. Today, less than half of Swedish research is funded in this way.

Moreover, the direct grants must be applied for in competition to a greater extent, he considers. He wants to identify a means of allocation whereby the funds are applied for in competition and excellence is rewarded. He also hopes to devise a system for long-term research funding.

"When a grant is awarded, it should apply for longer. One model may be to combine this with applying for funds on a competitive basis."

Several of Sweden's state research-funding agencies have, in recent years, provided long-term support for strong research environments, which must compete for it. One example is the support from the Swedish Research Council and the Swedish Agency for Innovation Systems (VINNOVA) for four Berzelius Centra. Another example is the Linnaeus Grants provided by the Research Council and Formas (the Swedish Research Council for Environment, Agricultural Sciences and Spatial Planning). However, Lars Leijonborg would like to go one step further: he is thinking of creating an elite or Nobel university according to the German model.

Knowledge a means of competing

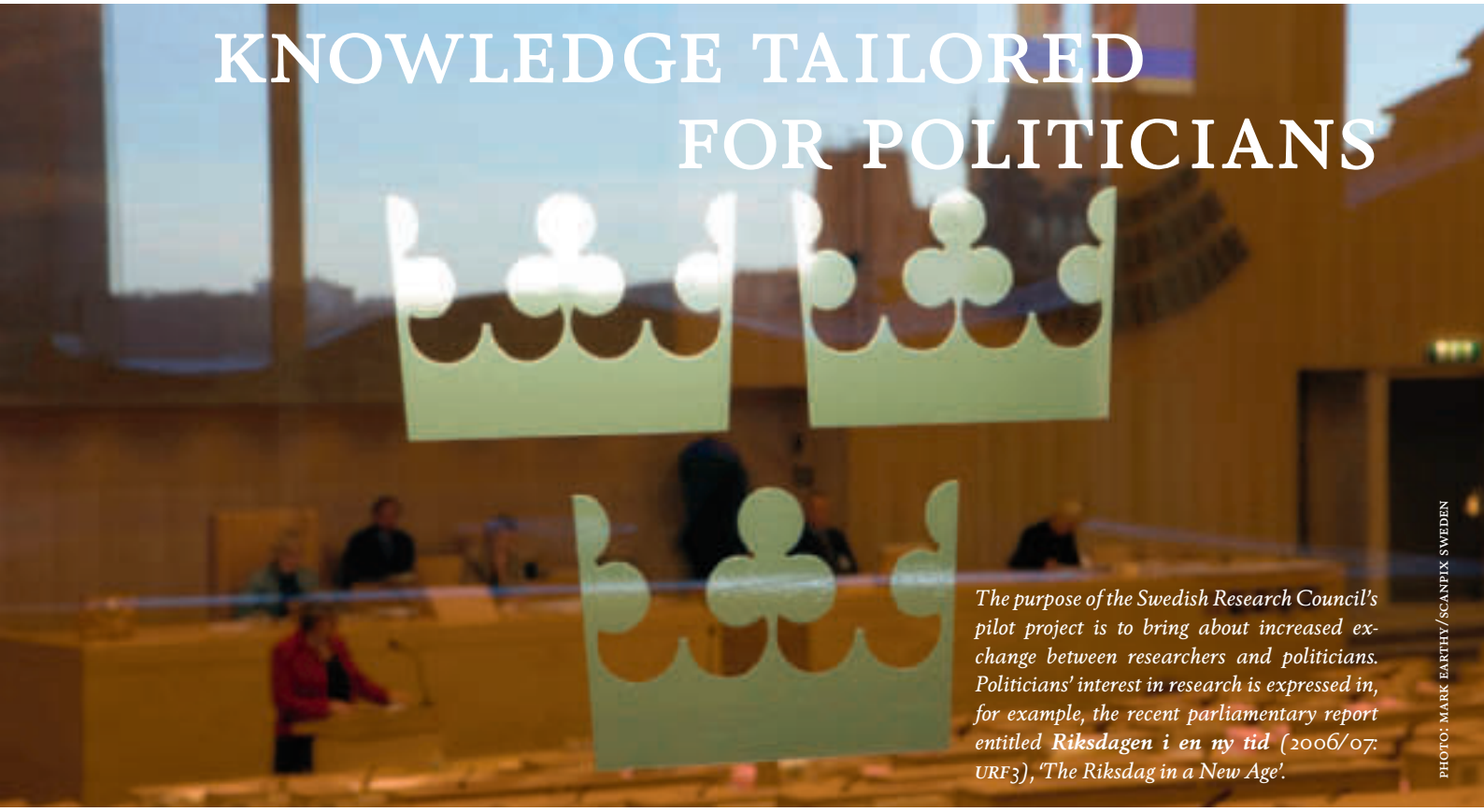
The present-day structure of appointments at Swedish higher education institutions (HEIs) is one concrete problem to tackle. Close to a third of the staff are employed on a temporary basis — twice as many as in the rest of the labour market — and career paths for researchers are indistinct. Here, Lars Leijonborg awaits the conclusions, due in November 2007, of a commission of inquiry appointed by the previous government.

"But we must improve career paths and, for instance, create more postdoctoral positions. Sweden isn't turning out too many researchers, although there is some graduate unemployment at present. In the slightly longer term, investing in postgraduate education is a wise option," says Lars Leijonborg.

In the academic world and in industry alike, there is room for trained researchers, he maintains.

"For us, at a time of globalisation when competition from the surrounding world is increasing, knowledge is the paramount way to compete. When China is setting out to be the workshop and India the office of the world, Sweden's niche can be to have the world's best laboratories and design establishments. We've also started an initiative to bring more teachers with PhDs into upper secondary school." *

KNOWLEDGE TAILORED FOR POLITICIANS



The purpose of the Swedish Research Council's pilot project is to bring about increased exchange between researchers and politicians. Politicians' interest in research is expressed in, for example, the recent parliamentary report entitled ***Riksdagen i en ny tid*** *(2006/07: URF3), 'The Riksdag in a New Age'.*

PHOTO: MARK EARTHY/SCANPIX SWEDEN

BY JESSICA RYDÉN

Researchers and politicians will soon have new opportunities to meet and exchange knowledge. In a pilot project, the Swedish Research Council is trying out various forms of improved liaison between the research community and the people's representatives. The aim is for more political decisions to rest on a scientific foundation.

Today, there is growing interest in research issues in the Riksdag (Swedish Parliament), says Eva Krutmeijer, who is in charge of the Research Council's pilot project *Mötesplats för forskare och folkvalda* ('A Meeting-Place for Researchers and MPs').

"Both the politicians and the Riksdag officials are very thirsty for new knowledge. And the researchers want their findings to be put to use."

Events at which researchers and politicians mingle have been arranged before under the aegis of the Research Council. What is new is that the Council will now work more actively to bridge the gap between the two worlds. The idea is that the Research Council's communicators can tailor various activities to the Riksdag members' wishes. These activities will be based on a thorough investigation of what the politicians want, Eva Krutmeijer relates.

"I've been in touch with several standing committees of the Riksdag to identify their needs. One result is that a group of researchers have attended a meeting with the environmental committee. The theme was the threat of climate change, and the politicians obtained both an overview of present knowledge and an introduction to current research."

Need to be good teachers

The Research Council's role is to devise a concept whereby knowledge from the research community is imparted to politicians as efficiently as possible.

"We're not just going to pick out the best researchers in the field. They'll also have to be skilled teachers and inspiring speakers. Unless the politicians understand what the researchers are saying, there's not all that much point."

Tailored sessions on various themes are just one of several forms of knowledge exchange that the Research Council will now try out. Another idea is to arrange short breakfast meetings with researchers to discuss current topics, such as avian influenza or care of the mentally ill. There is also a mutual need for information. As Eva Krutmeijer points out, the politicians need to learn more about research and researchers more about politics.

Self-remedying system

However, the question is how interested researchers are in a mutual exchange of views. One criticism put forward in the media debate is that politicians tend towards bias, embracing studies that support their own political agendas, while failing to consider the overall state of knowledge. At the same time, engaging in the task of public consultation still gives researchers few bonus points. But Eva Krutmeijer believes that the sometimes mutual suspicion can be overcome. There is an interest in getting together, and the workings of the system will include a self-remedying effect, she thinks.

"If researchers notice that their findings are being misinterpreted, they won't want to keep in touch with politicians. Likewise, researchers who don't succeed in conveying knowledge intelligibly will be shown the door by the politicians."

Personal contacts vital

The initiative for the project came from Björn von Sydow, the former Speaker of the Riksdag, who now chairs the Board of the Swedish Research Council, during the 'Research Day' arranged by the Riksdag in March 2004. The original idea was to include politicians too as users of the 'Expertanswer' service through which, since 2000, communicators at higher education institutions have helped journalists to find researchers for interviews or to supply factual background.

"The plans for an expanded Expertanswer service still exist. But it became clear that very much more was needed and that it's important for there to be face-to-face meetings where politicians can talk to researchers without journalists being present, and where they venture to ask whatever questions they like, says Eva Krutmeijer." ✱

'A Meeting-Place for Researchers and MPs' is headed by a reference group with representatives from the research community, the Riksdag, the Public & Science association and the Association of Swedish Higher Education. The Chair is Bengt Westerberg, who chaired the Board of the Swedish Research Council until December 2006.

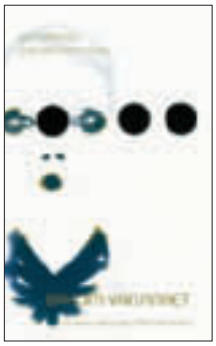


ILLUSTRATION: STINA WIRSÉN

PAPERBACK RESEARCH COLLECTION

The Swedish Research Council has launched a new series of books. This paperback popular-science series ('Pop') caters for a broad readership and touches on issues relating to everyday human situations. In the books, researchers from various subject areas give their answers to topical social questions. Why, for example, doesn't everyone learn to read and write at school? Are there more psychotic breakdowns nowadays than there used to be? And how will nanotechnology affect our lives?

"The idea of the 'Pop' books is to give readers a chance to form their own views on important social issues," says Kristina Sundbaum, the series editor.

"There are many popular-science books and magazines. But we think this series may stand out, since we've gathered in a single book research experts from many different fields, with disparate viewpoints on the same issue. The reader becomes acquainted with widely varying perspectives and current research findings from some of the foremost researchers in their fields."

The paperback popular-science books are part of the Swedish Research Council's function of disseminating knowledge from the research community to other parts of society.

"The language is intended to be easy to understand. We chose the paperback format to keep the cost of the books down and make them easy to carry and get hold of. Our hope is that people will be able to buy them in the paperback racks at food stores," says Kristina Sundbaum.

Reading, insanity, nanoscience

In the first book, *Den hemliga koden* ('The Secret Code'), researchers in education, genetics, languages, speech therapy, psychology and brain science give their perspectives on issues relating to reading and dyslexia. How can parents and teachers inspire and help children with their reading? And what, in fact, happens when we learn to read?

Book number two raises the issue of mental illness connected with violent attacks. In the media, the mentally ill, released from mental hospitals and left in the lurch, are often portrayed as a danger to society. *Bakom vansinnet* ('Behind Insanity') focuses on current research on the associations between mental disease, violence, the mass media, fear, punishment and social care.

The third book raises the issues of nanotechnology and its potential, but also its risks. How will this technology affect our lives? What are its ethical aspects? ✱

NEW WAYS FOR RESEARCH TO REACH OUT

BY RAGNHILD ROMANUS

At the end of September 2006, the Swedish Research Council took part in two major popular-science events: Kunskapstorget (the 'Knowledge Marketplace') at the Göteborg Book Fair and Researchers' Night. Concurrently, an international science competition was held for young people in Stockholm. Here, too, the Research Council was one of the arrangers.

Fostering the development of research communication in Sweden is one of the Research Council's functions. This is also why the Council was among the founding partners of the Knowledge Award (Kunskapspriset) and the TV series and knowledge overview, 'The Planet' (Planeten).

POPULAR SCIENCE BIG AT THE BOOK FAIR

The popular-science programme at the 2006 Göteborg Book Fair, on 21–24 September, attracted a large and engrossed audience.

At the 'Researchers Marketplace' *(Forskartorget)*, as the auditorium for popular science at the Fair is called, more than 7,000 people listened to the 62 short lectures and three longer seminars on offer. These covered a wide range of topics, from 'The Influence of Pornography on Contemporary Youth' *(Pornografins påverkan på dagens ungdom)* to 'What Can we Do about Resistant Bacteria?' *(Vad kan vi kan göra åt resistenta bakterier?)*.

The theme for the Fair, 'Freedom of Expression', was also reflected in the popular-science programme. Hot from the press for the Fair was a theme issue of *Tvärsnitt* ('Cross-Section') — the Swedish Research Council's journal about the Humanities and Social Sciences — dealing with freedom of expression.

In 2007, too, the Research Council, in cooperation with higher education institutions, foundations, museums and organisations, will be on the spot at the Fair to convey popular science to a broader audience — for the fifth consecutive year.

"Meeting such an enthusiastic audience, thirsting so much after knowledge, is superb feedback for all of us who work in research communication," says Mona Holmfors, the Researchers' Marketplace project manager. ✱

RESEARCHER PANEL IN LIVE WEBCAST

With a research panel wired up and facing webcams to answer incoming questions, the Swedish Research Council webcast live on 22 September.

The 11 researchers on the panel represented a range of different subject areas, so viewers were able to pose questions about ethics and policy, as well as health, climate change, wireless communication and space.

"Webcasting opens up completely new opportunities for reaching youth, for example," says Eva Krutmeijer, the presenter.

The webcast was part of the Swedish focus of Researchers' Night, which is a European Commission initiative whereby during a single day, in various parts of Europe, numerous different activities are under way to boost interest in research among the public, and young people in particular. ✱

PRIZE FOR DISSEMINATING KNOWLEDGE

One of the five recipients of the Knowledge Award for 2006 on 26 October was Helen Rundgren, a science journalist who has made TV programmes and films, and written books, for children.

The Award, for a total of SEK 1.25 million, is given annually to people in Sweden who stimulate others' quest

PHOTO: FREDRIK PERSSON

One of the other first prizes was awarded to 19-year-old Tomasz Wdowik from Poland, for finding new components that can develop beta-blockers. The other was won by two 19-year-olds from Austria, Michael Kaiser and Johannes Kienl, shown here dressed in pilot uniform at the prizegiving ceremony at the Grand Hotel in Stockholm. They have developed an energy-saving method of deicing aircraft wings during flight.

for knowledge in novel, unusual or enjoyable ways. The Swedish Research Council is one of the partners that supported the Award, which was instituted by the Swedish National Encyclopedia in 2002. ✱

COMPETITION TO INSPIRE RESEARCH

The underlying idea of the European Contest for Young Scientists is that youngsters should inspire one another to go in for research and the Natural Sciences. The competition was arranged in Sweden for the first time in 2006.

One of the first prizes in the 18th scientific competition known as the European Union Contest for Young Scientists was awarded to two 19-year-olds, Alexander Joos and Johannes Burkart, from Germany. They had disproved established mathematical formulae concerning the flight curve of a ping-pong ball spinning through the air, and found a new, better formula.

The contest caters for upper-secondary pupils aged 16–21. More than 120 youngsters and nearly 80 projects had qualified in national contests for the finals in Stockholm on 23–28 September 2006. The project work was exhibited at the National Museum of Science and Technology. Some exhibits were pure inventions, others more theoretical, and all were carried out by means of scientific methods.

Thanks to this contest, young people from different countries have a chance to get together and share their interest in research and the natural sciences. At the same time, the exhibition serves as inspiration for teachers and students wishing to see how to go about doing project work, says Anders Sahlman, the project manager for the contest.

The jury comprised 15 eminent researchers from around Europe. During the days of the contest, the jury members walked round the exhibition interviewing the participants about their projects. In this way, the jury obtained a clear understanding of how the contestants had gone about their projects, and the participants received feedback. Oral presentations, too, were assessed.

A total of SEK 270,000 was awarded, with three first prizes and an equal number of second and third prizes. According to the jury chairman Jane Grimson, Professor at Trinity College, Dublin, the standard of contestants has risen from one year to the next.

The European Commission has arranged the European Union Contest for Young Scientists annually since 1989. The organisation responsible for the Swedish arrangement is the Swedish Federation of Young Scientists (FUF), in cooperation with the Swedish Research Council and the Royal Swedish Academy of Sciences. FUF works to foster young people's interest in the Natural and Engineering Sciences by various means, including scientific contests. ✱

ILLUSTRATION: SANDBERG & TIMONEN

THE PLANET AT THE CINEMA, ON TV AND ONLINE

The state of our planet Earth was an issue that received a great deal of attention in Sweden – at the cinema, on television and online – during autumn 2006. The bodies responsible for this information campaign were various research-funding agencies, in cooperation with Swedish Television and a private film company.

The Planet, a full-length documentary film, opened at Swedish cinemas on 1 September 2006 and the series *The Planet* began to be broadcast on 9 November, i.e. the same day as *The Planet* knowledge overview opened on the website forskning.se.

The film, TV series and knowledge overview alike are about the Earth today and in the year 2050, and how environmental changes may affect the scope for human health, subsistence and welfare. The content, presented in a popular-scientific way, is based on international research. Aspects of global environmental changes relating to both the Natural and the Social Sciences have been emphasised.

The primary target group has been upper-secondary pupils, but other groups have included salaried employees, decision-makers and the general public. The knowledge overview at forskning.se was compiled by the research-fund providers who own the website. The film and TV series were paid for mainly by Swedish Television and the film company Charon, but some of the website funders have also made contributions. One of them is the Swedish Research Council.

"We're aiming to give people more knowledge of the requirements for a sustainable life on this planet. There are global threats, including climate change, that it's imperative to disseminate knowledge about. The *Planet* project is a good way of giving research findings more coverage in society, to give people more knowledge of the requirements for a sustainable life on our planet," says Lena Wollin, Director of Communications at the Swedish Research Council.

The *Planet* game, which is accessible both through Swedish TV and at forskning.se, is also part of the knowledge initiative. The purpose of the game is to provide understanding of the consequences our actions have, and of how our impact on the future of our planet may become better or worse.

"This kind of coordinated knowledge campaign has every prospect of exerting a considerably better impact than its constituent parts. The parts complement and foster interest in one another."

For example, the knowledge overview at forskning.se serves as a fact bank that enables people to get answers to questions posed in the film, TV series and game. The idea is that everyone, irrespective of preliminary knowledge, should be able to benefit from this multimedia fact bank and instrument of popular education on climate-related research.

Knowledge overview

At forskning.se, several knowledge overviews have been drawn up previously along the same lines as *The Planet*. These have been about the new biology, the brain and the Baltic. In each case, facts are based on scientific foundations and presented in an easily intelligible and instructive way using text, illustrations, animations and interactive video.

Forskning.se has existed since spring 2002. Since 2006, ten research-funding agencies have jointly run the website. Of these, four – the Swedish Environmental Protection Agency, Swedish Energy Agency, Swedish Research Council for Environment, Agricultural Sciences and Spatial Planning (Formas) and Swedish Research Council – have provided extra support for *The Planet* on forskning.se. ✱

PHOTO: DAN HOLMBERG/SCANPIX

WORLD CONFERENCE IN SWEDEN ON RESEARCH COMMUNICATION

BY GUNHILD WALLIN

Building bridges between researchers and research communicators is one of the overarching objectives of the international Public Communication for Science and Technology (PCST) conference to be held in Malmö on 25–27 June 2008. The Swedish Research Council will host the conference jointly with Swedish and Danish partners.

The silhouette of Öresund Bridge is the emblem of the PCST Conference in 2008, but also a metaphor of the conference theme of building bridges between research and society.

PCST is a global network of communicators, journalists, researchers and other people with an interest in research communication. The aims of PCST include bring research on research communication to the fore, showing best practice in the area and creating virtual and physical forums, such as the recurrent world conference, for discussion of issues relating to research communication.

Since the network was formed in 1989, it has held an international conference every other year. In 2006, Korea was the host country; now it is Sweden's turn to arrange the tenth conference. This will be the first time that the PCST world conference has been held in a Nordic country, and up to 700 delegates are expected to attend.

"We hope that researchers and communicators from all over the world will give us interesting presentations of research findings in research communication, and of best practice where this communication has worked well," says Birgitta Myrman, Deputy Director of Communications at the Swedish Research Council.

Locating the conference in the dynamic Öresund region is a conscious choice. The region contains a bridge that links two nations and generates new collaboration between research and enterprise. The silhouette of Öresund Bridge is the emblem of the conference, but also a metaphor for the overall theme of the conference: bridge-building for a sustainable future in which the encounter between research and society is a key feature.

Arousing public interest in research is one theme; developing infrastructures for research communication is another. The latter relates, for example, to the issue of training researchers to communicate their own research better.

"Upgrading the importance of research communication and its deserved value is strategically important from both a democratic and a commercial point of view," says Birgitta Myrman.

The conference reflects cooperation between universities and research funders in Denmark and Sweden, including Öresund University. Another partner involved is the Royal Swedish Academy of Sciences, which is to hold a preconference on the theme of the Nobel Prize. Already, visitors to the conference website can freely specify which Nobel laureates they wish to see participating.

"My hope is that the conference delegates will leave Malmö with new ideas, practical recommendations and greater knowledge of research communication. The intention is that the conference should be enjoyable and light-hearted, but fundamentally dead serious," says Birgitta Myrman.

Read more at www.vr.se/pcst ✱

CELEBRATING LINNAEUS – CHAOS, SYSTEM AND PASSION

Magnolia stellata *from the photo exhibition and book entitled 'System and Passion' (**System och passion**), in which the photographer Helene Schmitz has illustrated the structure of the 'sexual system' expounded by Linnaeus.*

PHOTO: HELENE SCHMITZ

BY JESSICA RYDÉN

On 28 January 2007 the Linnaeus 2007 tricentennial began. With hundreds of commemorative events all over the country, the Swedes will become aware of perhaps their greatest scientist of all time.

This year, it is 300 years since the birth of Carl von Linné, known in the English-speaking world as 'Linnaeus', i.e. the tercentenary of this man of science. And if the national hero has previously suffered from partial neglect, the Swedes are now amply making up for it. The official *Linnaeus* 2007 tricentennial, headed by a national delegation, is involving large segments of the Swedish public sector – scientific institutions, schools, municipalities, county administrative boards, museums – and especially the tourist industry.

Travelling exhibition

Numerous regional and five national arrangements are seeking to broaden the public image of Linnaeus and arouse interest in the natural sciences. Among the arrangers of the travelling exhibition 'Chaos and Linnaeus' (*Kaos von Linné*) is the Swedish Research Council. This exhibition invites visitors to an experience on the theme of order and chaos, and is addressed at young people in particular. It is based on tricky questions or descriptions inspired by more or less outdated theories or prejudices about how we human beings have organised various matters.

Lena Wollin, Director of Communications at the Research Council, hopes that the exhibition will encourage youngsters to ask questions and seek new knowledge. One of the Council's functions is to foster research outside the laboratory, seminar rooms and scientific publications.

"In this work, young people are vital. Not only because we want to encourage them to keep studying, and go in for research. The aim is also that, as citizens, they'll get involved and question conventional wisdom."

Lena Wollin sees dissemination of research findings as a legacy from Linnaeus.

"Science doesn't become knowledge until it's shared by many people. I don't think Linnaeus actually said so, but I'm convinced that he thought like that. He had the ability, and not least the wish, to explain his research so that others could understand."

Photographic exhibition

'Chaos and Linnaeus' may be described as an encounter between art and science. The same applies to the photo exhibition and book entitled 'System and Passion' (*System och passion*).

The idea came to photographer Helene Schmitz when she discovered that there was no photographic book illustrating the structure of the 'sexual system' expounded by Linnaeus. Now the book exists – and has had the honour of being selected as the official book of the tercentenary. In extreme close-up, in images of breathtaking beauty, she shows us plants classified according to the 24 categories identified by Linnaeus.

"Illustrating the structure of plants on the basis of Linnaeus's system, not just taking pretty pictures, has been important to me," emphasises Helene Schmitz.

The pictures are also supplemented by Linnaeus's own plant descriptions, which use metaphors from human sexuality. One plant is described, for example, as 'eight men in the bridal chamber with the same woman'.

Film in Linnaeus's footsteps

Devoting attention to Linnaeus's groundbreaking classification system is a self-evident ingredient in the tercentenary. But the arrangers also want his reverence for creation and the unity of nature to inspire young people, so that they discover the natural environment for themselves and safeguard its survival.

One way of providing this inspiration is the film 'The Linnaeus Expedition' (*Expedition Linné*), which is also supported by the Swedish Research Council. In the film, three young researchers accompany the world-famous nature photographer Mattias Klum, like apostles of Linnaeus, on a journey across seven continents. The film sets out to be both a wake-up call and an answer to the question of how to save the natural world, according to Folke Rydén, the journalist who produced the film.

"I got a shock when I found out how close we've come to the point of no return," Folke Rydén stated at a press meeting, and his young fellow travellers agreed.

Lorena Grubisic from the University of Kalmar re-traced Linnaeus's footsteps in Lapland on a quest for a particular freshwater pearl mussel.

"In his diary, Linnaeus writes that he can't climb down into the water without constantly cutting himself on the sharp mussel shells. Now there isn't a single little mussel left, because of eutrophication, dam-building and so on," she relates.

Despite several discouraging experiences, the film also presents rays of hope, such as the discovery of a completely new species. Folke Rydén summarises what is perhaps the key purpose of both the film and the whole Linnaeus tricentennial.

"We must become more aware of what's happening in the natural environment. We show that researchers have answers to the question of what we have to do to save the planet. Then it's up to us all to do something about it." ✱

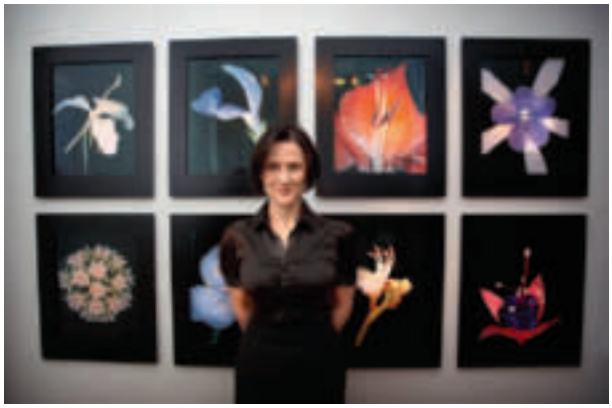


PHOTO: MATS SAMUELSSON

Photographer Helene Schmitz in front of her pictures from the book and photo exhibition 'System and Passion'.

KEEP AN EYE OUT FOR:

'Linné was here'. By following the signs that show Linnaeus's journeys around Sweden, the visitor can travel all over the country to places once visited by Linnaeus, and then compare his descriptions with present-day reality. Read more at www.linnewashere.se.

Linnaeus's travelogues, in Swedish, are published in paperback by Natur och Kultur. His 18th-century prose still comes across as vibrant, and his works are classics of Swedish literature.

Mobile research labs for young visitors will tour Swedish zoos this summer.

The Chelsea Flower Show is a key element in the Linnaeus tricentennial abroad. This major garden event, held in London at the end of May every year, will show a 'Linnaeus Garden' this year. The idea is, with Linnaeus' curiosity and love of nature as points of departure, to reflect our contemporary interest in architecture, art, design, nature and horticulture. After the Chelsea Flower Show, the garden will be moved to the Botanical Garden in Gothenburg, where it will form part of the Swedish celebrations.

Read more at www.linne2007.se.

'LINNAEUS 2007'

The national delegation that is coordinating all the local and national initiatives relating to the 'Linnaeus 2007' tercentenary was set up by the Swedish Research Council on behalf of the Government. Public lectures, scientific seminars, experiments, courses, guided walks, scientific cafés and exhibitions are examples of activities that are being arranged. Outside Sweden, too, the tercentenary has aroused a great deal of interest, and commemorative events include symposia and events at Swedish embassies.

GUNNEL GUSTAFSSON, DEPUTY DIRECTOR GENERAL OF THE SWEDISH RESEARCH COUNCIL, ON LINNAEUS:

Linnaeus is best known as a natural scientist, and especially for his botanical system of classification and nomenclature, Systema Naturae. But we should also note his versatile cross-disciplinary contributions.

With unimpeded ease, he moved between the Natural Sciences and Medicine, on the one hand, and the Humanities and teacher training on the other. He began his career as a medical doctor, and one of the reasons for his interest in plants was their healing effects.

Three hundred years is a long time and, these days, the conditions and methods of research are of course far from the same as in Linnaeus's day. Nonetheless, his example of intrepid crossing of established disciplinary boundaries is worth following.

DID YOU KNOW ...?

Linnaeus was a superbly skilled marketing man and educator, who took great pains to disseminate his findings among both the scientific community and the public.

As a teacher, Linnaeus was greatly appreciated. Hundreds of students were attracted to his lectures in Uppsala – at a time when students at the University numbered fewer than a thousand altogether.

One reason for Linnaeus's popularity as a doctor was his skill in curing venereal diseases.

Linnaeus used religious arguments to persuade his 'apostles' to travel abroad: it was their duty, he said, to document God's creation.

During his lifetime, Linnaeus was described as one of the ten most famous men in the world.

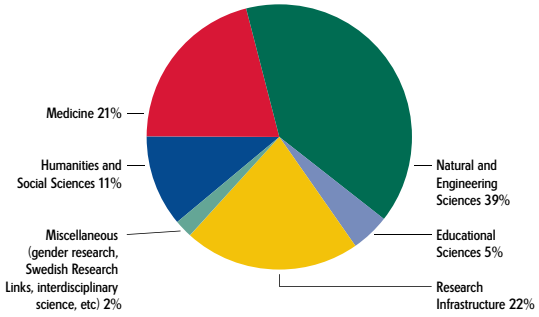
Source: Torbjörn Lindell, a Linnaeus expert, botanist and teacher at the Cathedral School (Katedralskolan) in Växiö.

THE SWEDISH RESEARCH COUNCIL IN NUMBERS

For more detailed statistics and information, please see the Annual Report of the Swedish Research Council (in Swedish).

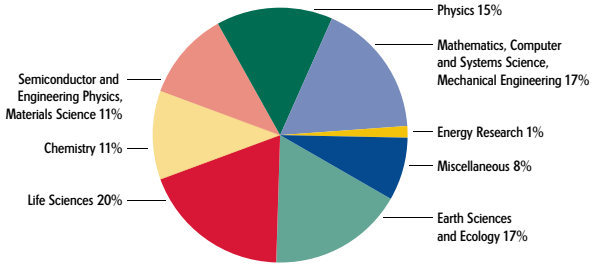
Funding by the Swedish Research Council in 2006

(Sum total: SEK 2,749 Million/EUR 291 Million)



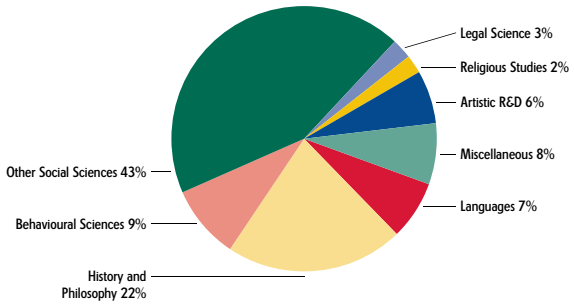
Distribution of grants allocated to Natural and Engineering Sciences in 2006

(Sum total: SEK 1,077 Million/EUR 114 Million)



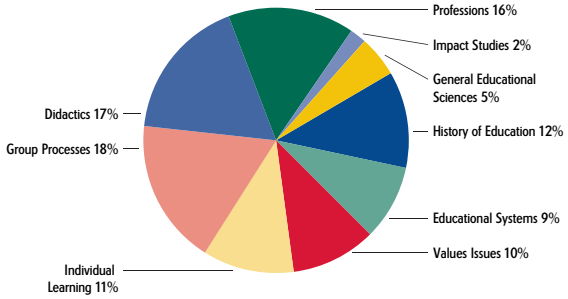
Distribution of grants allocated to the Humanities and Social Sciences in 2006

(Sum total: SEK 308 Million/EUR 33 Million)



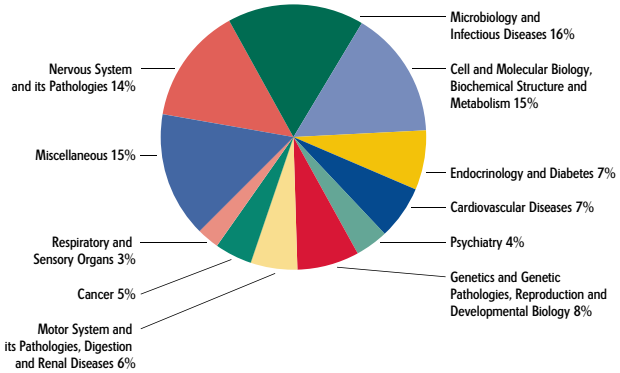
Distribution of grants allocated to Educational Science in 2006

(Sum total: SEK 129 Million/EUR 14 Million)



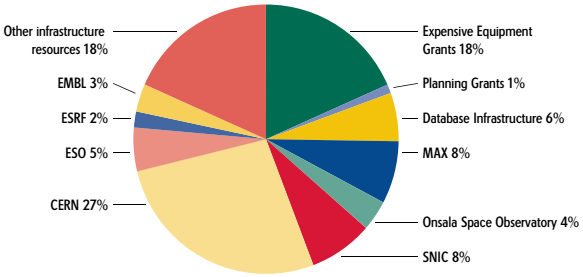
Distribution of grants allocated to Medicine in 2006

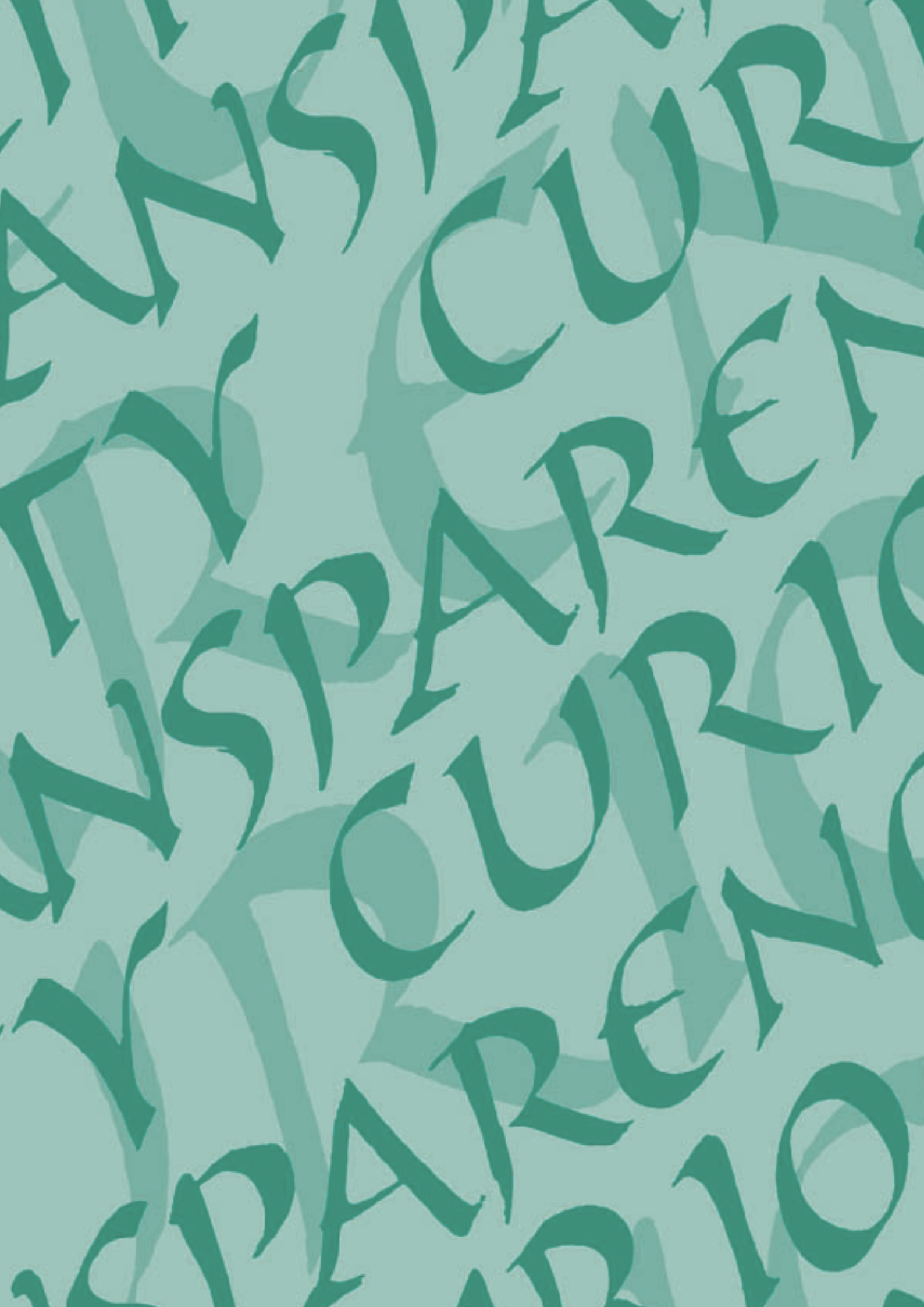
(Sum total: SEK 580 Million/EUR 61 Million)

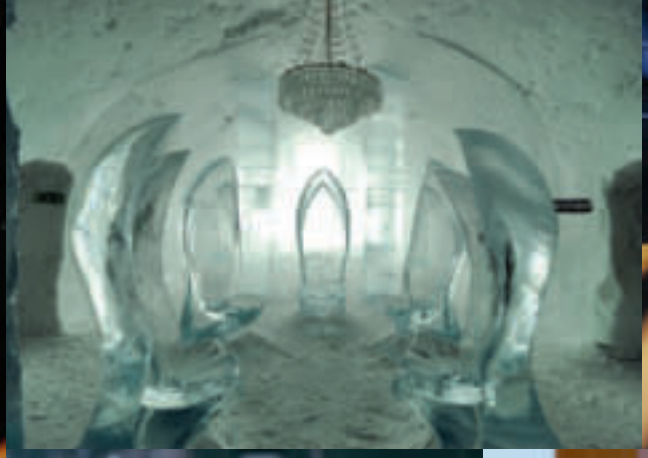


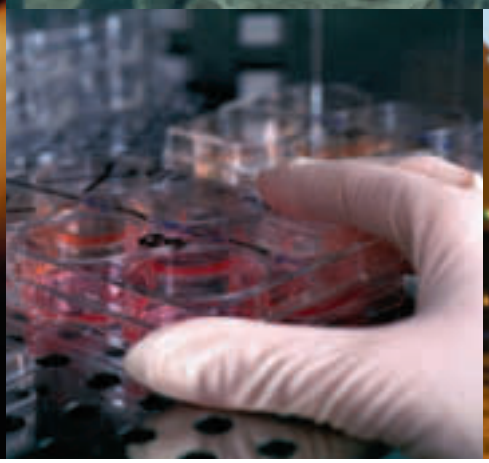
Funding of Research Infrastructures in 2006

(Sum total: SEK 595 Million/EUR 63 Million)








The Swedish Research Council is a government agency funding basic research of the highest scientific quality in all disciplines. The Swedish Research Council has a national responsibility to support and develop basic research and promote research innovation and research communication. The goal is for Sweden to be a leading nation in scientific research.