

The insider Focus on Scandinavia

How are Scandinavian nations rising to the challenge of building a world-class research infrastructure, asks **Tim Loughheed**

Funding the future

IT'S well known that Sweden is the world's top per capita investor in R&D. And you might think that the country's tradition of high taxation and generous public expenditure has created this sunny state of affairs. But you'd be wrong. Much of the country's research infrastructure now depends on support from industry. In fact, in Sweden and neighbouring Denmark and Norway, scientists are having to get creative about where they obtain their funds.

The truth is that while Sweden continues to top the world's list of research-intensive nations by spending 4.3 per cent of its GDP on R&D, more than three-quarters of that money comes from sources outside government. This level of private investment leaves many other nations green with envy, but for the country's academics, the paucity of the government's payout is worrying – even though it is the world's seventh most generous in relation to GDP.

"It's been, in real terms, a decline in public funding," says Carl Johan Sundberg, a physician and associate professor at Stockholm's Karolinska Institute (KI). He contrasts Sweden's situation over the past decade with the growing levels of public support for research in places such as Canada, the US and Australia.

Even at the KI – an internationally renowned institution nudging its 200th year – such support has been steadily declining, and the public proportion is now less than half of the total, Sundberg says. "We are thinking very strategically about other sources of money."

Sundberg has a front-row view of one of those sources, as investment director of the Karolinska Investment Fund. Established in 1999, this fund

nurtures pharmaceutical, biotech, and medical technology companies with strong commercial potential. By 2003, the fund had spawned a venture-capital firm, Karolinska Development, which quickly amassed more than €10 million to sponsor research-intensive start-ups such as Oncopeptides, a KI spin-off developing new cancer-fighting drugs.

For Sundberg, these entrepreneurial undertakings reflect the importance of technological innovation as one of the country's economic cornerstones. Sweden's history is packed with scientists and inventors who laid the foundation for enterprises that went on to become household names: appliance pioneer Electrolux, electronics giant Ericsson and drug manufacturers Astra and Pharmacia – which have since merged with multinational interests.

"Basically, people know how to put things into the market," says Sundberg, noting that though the whole of Scandinavia contains fewer than 25 million people it boasts some 350 biotechnology companies. "That is more than the UK, and a similar number to Germany."

Biotech bridges

The majority of these biotech firms are nestled on either side of the Øresund, the channel separating the southern Swedish region of Skåne from the Danish capital, Copenhagen. Since 2000, the two have been linked by a remarkable 16-kilometre bridge and tunnel (*New Scientist*, 21 June 2003, p 58). This region, dubbed Medicon Valley, now employs around 30,000 people in various branches of medicine or medical technology. The area is home to five major science parks, along with 26 hospitals, 12 universities and some 60 per cent of Scandinavia's

biotech and pharmaceutical industry.

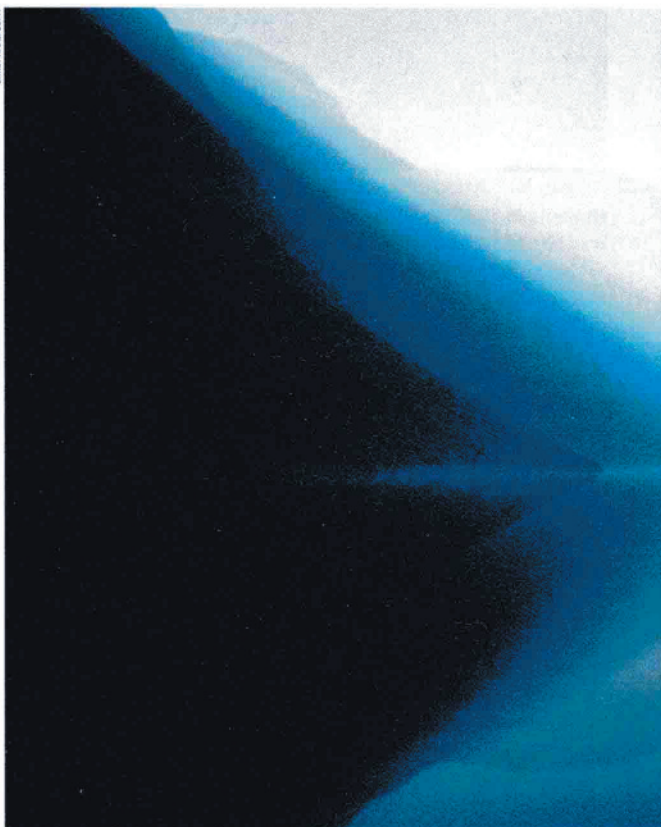
On the Danish side of the water, a centrepiece of the CAT Science Park is the Risø National Laboratory, which was founded in 1956 and now employs almost 800 people. For Klaus Nielsen, programme leader at Risø's plant research department, Medicon Valley has now palpably reached critical mass. "Where you have jobs, where you have energy, where you have dynamics – new companies, small start-ups – you get good people," he says.

But Nielsen has a dual role: he is also head of research at the Danish seed company DLF-Trifolium in Ny Østergade. "There's a great benefit for both parties besides the economical split of costs and split of risk," says Nielsen. Such public/private collaborations were ushered in by new legislation introduced in the late 1990s, which lowered many of the bureaucratic and financial barriers that had isolated centres such as Risø from partnering firms such as DLF-Trifolium.

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University of Oslo

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At Risø the changes have been sweeping, transforming an institution originally set up to study nuclear energy into a multidisciplinary organisation exploring wind energy, systems analysis and materials, as well as botanical work like Nielsen's.

Yet the example set by Risø remains largely exceptional within the Danish research community, which laments Denmark's relatively sparse investment in R&D compared with Sweden's. Only 2.4 per cent of the GNP is invested in this way, and more than 70 per cent of that is private money. Moreover, in spite of high levels of education and an enviable standard of living, some 35 per cent of graduates leave the country, and a third of them have failed to return after five years.

Those figures come courtesy of Erik Sørensen, CEO of the multinational food manufacturer Chr. Hansen, who also chaired a committee examining Denmark's education and research policy. This summer Denmark's prime

Norway's abundance of natural resources could mean there are fewer incentives to develop high-tech industries

minister, Anders Fogh Rasmussen, got an earful of Sørensen's concerns while touring the company's Copenhagen headquarters. "If we do not start making the necessary corrections, we are going to lose the battle," Sørensen told the PM. "Danish and European companies have traditionally been leaders in high-tech and biotechnology, but things are about to change."

Such calls for corrections are even more strident in Norway, where the latest report from the Norwegian Institute for Studies in Research and Higher Education observes a drop in the country's overall R&D investment from 1.65 per cent of GNP in 1999 to 1.60 per cent in 2001. Part of this decline, according to University of Oslo neurobiologist Ole Petter Ottersen, is fuelled by the fact that Norwegians tend not to regard research as a way of fostering economic growth – the prevailing mantra in most other developed nations. "We have been too lucky over the years," he says, noting that the country's route to prosperity has been eased by abundant natural resources, including timber, aluminium and offshore oil. "There has not been pressure on us to develop high-technology industries."

Natural advantage

Ottersen heads up his university's Laboratory of Molecular Neuroscience within the Centre for Molecular Biology and Neuroscience, one of 13 centres of excellence created by the Research Council of Norway in 2002. And he sees real scope for growth in R&D. "We have the possibility of being an extremely strong research nation," he says, pointing to international surveys that regularly put Norwegians at the top of rankings in education due to the country's high literacy rate and levels of enrolment at schools and colleges. This fund of intellect, combined with the financial clout Norway derives from its natural resources, should set the stage for dynamic research endeavours.

The 13 centres are one of Norway's attempts to turn the situation around. They were formed after a 1999 government report spelled out just how

anaemic public spending on research had become. Conceived as a network, they are also meant to address another of the R&D challenges faced by Norway: the fragmented nature of its research activities, which are scattered all over the country and often operate independently. "We are an old Viking country, and like the chieftains sitting on every hilltop, we have had the same situation in research," says Ottersen, bemoaning the lack of communication between individuals and institutions.

The same might be said of many parts of Scandinavia – which is why bodies such as the Nordic Council have started paying closer attention to research. Formed in 1952, the council provides an interparliamentary forum for the region's five countries (Sweden, Denmark and Norway, plus Finland and Iceland) to discuss matters of common interest. It is now working with the Nordic Medical Research Council and the Nordic Academy for Advanced Study, which provide similar forums for administrators from each country.

These interactions led to the founding of three multinational Nordic Centres of Excellence this year, including one led by Ottersen investigating medical disorders related to water imbalance. For his part, Ottersen sees this new opportunity as yet another sign of the growing cooperation in the region, and in Europe generally. "There are so many attempts to make the different countries pull together," he says (see *New Scientist*, 27 March, p 50).

Even in Sweden, where R&D efforts would seem to be at fever pitch, Sundberg is no less enthusiastic about the prospects of pooling Scandinavia's resources in this way. "We look upon the Nordic region as our home base," he says, adding that people in that region are eager to overturn the stereotype of a high-priced enclave where taxes protect researchers from cheaper global competition. "You get extremely good quality [science] for a reasonable price." And surely that's an attractive prospect, no matter who is footing the bill? ●

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