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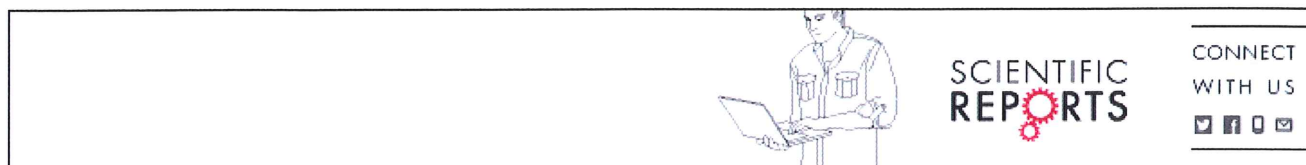
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Institutions shake off rivalries to build scientific collaborations and hire world-class talent.

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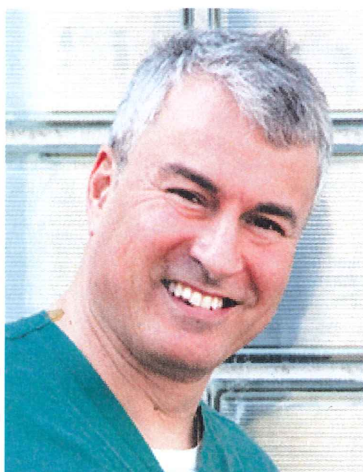
The MAX IV synchrotron light source in Lund, Sweden, will offer chances for collaboration across the country.

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Since the global financial crisis, Sweden has lived in an alternative universe of science funding. While austerity policies have kept research funding levels flat in much of Europe since 2008, Sweden's public science budget has increased by 5 billion Swedish kronor (US\$786 million) over the past 5 years with a rise of another 4 billion kronor to come over the next 5 years. And, as seemingly endless government budget battles have slowed US infrastructure investment, Sweden has seen a building boom. The country has constructed a national high-throughput life-sciences laboratory; begun building new clinical-research laboratories and a hospital; and broken ground on a powerful synchrotron light source and a neutron source.



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Stefan Hansson: "You will see more collaboration between technology and health care."

Now Sweden is increasing international recruitment, backed by public and private money, to fill its facilities and fulfil ambitious research agendas. The Knut and Alice Wallenberg Foundation in Stockholm has been the biggest non-government player in infrastructure investment and international science hiring. Last year, the foundation introduced the Wallenberg Academy Fellows programme to recruit and fund 300 young scientists over 10 years, aiming for 30–50% of the fellows to come from outside Sweden.

The region, however, is adjusting to big changes at pharmaceutical giant AstraZeneca, a long-time presence in Sweden. Since 2010, the company has cut close to 2,000 jobs as it seeks to consolidate all its Swedish research into one facility in Mölndal. But that has provided an incentive for other institutions to take up the mantle of clinical studies. Former AstraZeneca researchers have translational skills, and Sweden has good databases of individual health records with ample data that are useful in clinical medicine. AstraZeneca's restructuring “gave us an important signal”, says Stefan Hansson, vice-dean for medicine at Lund University. “We now maybe need to work more on clinical research. How do we integrate that with our hospitals? How will clinicians add research?”

Bouncing back

Sweden had its own financial struggles in the 1990s, which stymied big growth until the late 2000s. The country must attract world-class scientists from beyond its borders to remain globally competitive, says Göran Sandberg, executive director of the Wallenberg foundation. “We don't have enough bright people to compete internationally.” Wallenberg and other organizations are aiming to address that shortage through stable funding and elite facilities. “Sweden is far north and it is a small country, but if you give people scientific freedom they are willing to move,” says Sandberg.

David Drew, a New Zealand-born biophysicist, won such freedom with a Wallenberg Academy Fellowship last year. The appointment came with 2.5 million kronor to start his lab at Stockholm University and another 7.5 million kronor to run it for five years, with no need to worry about writing grants, he says. Individual scientists cannot apply for the fellowships: departments of Swedish research institutions make nominations, which are judged by panels that include members of the royal academies. The foundation makes the final decision.

People push

The Wallenberg Foundation made its biggest investment in 2003, when it funded the Human Protein Atlas. The project, which has cost the foundation 900 million kronor so far, has characterized 15,000 proteins to date using antibodies, and involves hundreds of scientists.

It served as a test case for large-scale science in Sweden, says Sandberg. The atlas also helped to bring together researchers from institutes including the Karolinska Institute in Stockholm, Stockholm University, Uppsala University and the Swedish Royal Institute of Technology in Stockholm. Together, they formed the Science for Life Laboratory (SciLifeLab).

The network is devoted to high-throughput, interdisciplinary research with translational applications, and has grown to about 1,500 people since its sites in Uppsala and Stockholm were established in 2010. There are still facilities in both cities, but since July SciLifeLab has been managed as a single national laboratory, giving its scientists access to a wide array of expertise and equipment. Director Mathias Uhlén says that the organization is in the process of hiring eight group leaders, and intends to add more scientists next year.

Sweden's relative strength in the global economy should help. "Most ambitious young scientists are going to places where they have the best resources," says Uhlén. "With the funding we can provide to young researchers, they can thrive." SciLifeLab receives 340 million kronor a year from the government, a sum that is set to increase to 400 million kronor in 2016. The Wallenberg foundation provides about 120 million kronor yearly, and funding for individual projects can come from other sources.

SciLifeLab awards "very generous" start-up grants, says Sven Nelander, a cancer systems biologist at Uppsala University. This July, he received further support from AstraZeneca, which has established a joint research programme to fund 10 SciLifeLab projects with a total of up to US\$10 million a year over the next five years.

Scientists joining SciLifeLab will find not only good funds and facilities, but also a collaborative culture, says Uhlén. Stockholm University provides bioinformatics support and research, the Royal Institute of Technology offers high-throughput technical expertise and the Karolinska Institute and Uppsala University both use their clinical bases to ask scientific questions that researchers from all four entities help to answer.

Nelander, for example, is working to develop mathematical models of tumour progression to shed light on how genetic mutations cause cancer. He uses cell samples from people with cancer at Uppsala University Hospital and takes them to SciLifeLab's Stockholm site, where screening experts help to characterize them. Then he draws on the mathematical expertise of colleagues at the University of Gothenburg, where he was based before he went to Uppsala.

Although Drew is not part of SciLifeLab, he can tap into its expertise to create computer models of the protein-transport process. He can also draw on its high-throughput capabilities to look for small molecules that might bind to transport proteins and inhibit their action.

"We're really building a community," says Kerstin Lindblad-Toh, co-director of SciLifeLab. "People who work on mathematics in one corner can now work with people who focus on cancer in another."

Infrastructure potential

SciLifeLab recruits stand to benefit from other facilities going up in the Stockholm–Uppsala region. The Karolinska Institute is set to open a new university hospital in two years, and construction began last month on a medical-research facility called Biomedicum that will open in 2018 with room for 1,700 researchers.

AstraZeneca maintains a presence in Stockholm. In 2012, the firm established a translational research centre at Karolinska, emphasizing biomarkers. AstraZeneca researchers work alongside Karolinska scientists at the centre, and the company funds several research groups, including graduate students. AstraZeneca is also launching a unit to work on cardiovascular and metabolic disease at Karolinska.

These relationships with academia mark "a new way of operating" for the company, says Anders Ekblom, AstraZeneca's global head of science and technology integration. He notes, however, that the initiative will not create jobs for people who lost research posts with the firm.

Lund should also see growth in scientific recruitment over the next decade, as two major infrastructure projects come on line. The area already hosts three synchrotron particle-accelerators, which use high-speed electrons to create X-ray radiation for spectroscopy and imaging, but in 2010 construction began on a new synchrotron light source: MAX IV, which will open in 2015 and will be the brightest in the world. The aim is to draw researchers from around the world to image materials ranging from proteins to nanoscale molecules.

Lund has also won funding from the European Commission to host the European Spallation Source, a powerful neutron accelerator for materials research that is due to open in 2020. Together, the facilities will create an international hub for materials science, structural biology and nanotechnology.

Hansson says that the European Spallation Source and MAX IV will help to create more of a balance between southwestern Sweden and the more southeasterly Stockholm–Uppsala area. He foresees, for example, researchers from SciLifeLab using the Lund facilities to determine structures of target proteins and molecules that might bind to them. “You will see more collaboration between technology and health care,” Hansson says.

Even with all these vehicles for collaboration, Sweden's science is not free from conflict. Historically, there have been rivalries between institutions in Lund, Stockholm and Uppsala, born mainly of fights over funding and resources. “It's true that there has been some tension,” says Karolinska president Anders Hamsten.

But as more SciLifeLab fellows start to cooperate with sites in other parts of the country, tensions should ease, he says. This summer, SciLifeLab held workshops showing how researchers at other universities can tap into the lab's high throughput resources. Hamsten hopes that Karolinska's involvement in SciLifeLab will help to attract world-class scientists to the institute.

When Drew got word that he had landed the Wallenberg fellowship, he says, he felt gratitude and relief in equal parts: “This was going to be a long-term commitment where the university was serious about me staying.” He remembers thinking, “They want me. It is being matched with a nice level of funding with the vision that this is long term.” The good quality of life in Sweden — including free or inexpensive childcare — was also welcome. And to tackle the long, dark Nordic winters, Drew intends to tap into another benefit: lots of holiday time. He plans to spend a few weeks each Swedish winter in New Zealand. “This way,” says Drew, “I get two summers.”

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