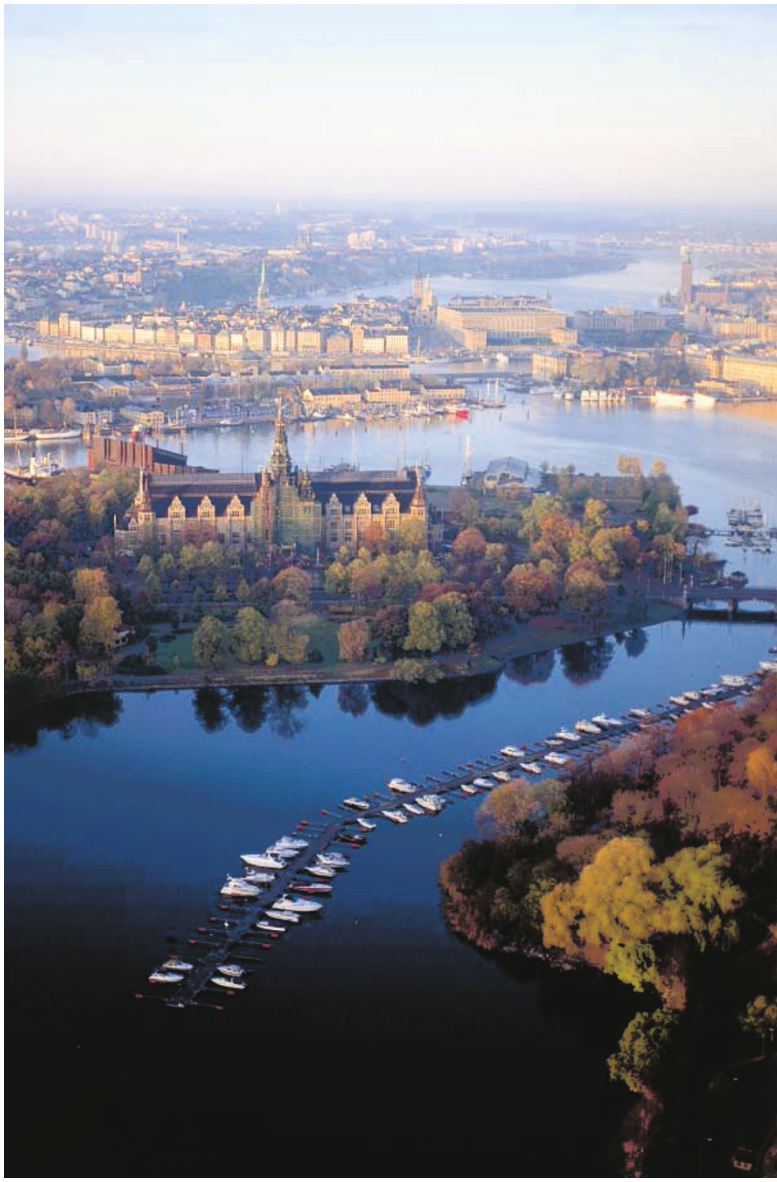
Blurred vision

Seeking to capitalize on Sweden's scientific strengths, Stockholm and Uppsala are bringing business and academia together, says Paul Smaglik.



Stockholm: home to a range of public-private initiatives.

STOCKHOLM TOURIST BOARD

Sweden, it seems, has a major case of role reversal. In Stockholm, the head of pharmaceutical company AstraZeneca's global drug-discovery unit hails from the Karolinska Institute. By contrast, the leader of the Karolinska Institute's genome and bioinformatics centre once worked for Astra.

In Uppsala, the situation is similar. There, scientists and executives at Amersham Biosciences, the life-sciences equipment firm, often teach at Uppsala University, and professors at the university are becoming increasingly involved in local start-up firms, which themselves are often run by managers who developed their skills at Amersham.

Such movements and connections were unheard of in Sweden 10 years ago, but now they are increasingly common. They represent a blurring of the boundaries between commerce and academia that has come about through both necessity and design.

On the one hand, the failure of the Swedish government to increase its commitment over the past decade to basic biomedical research as aggressively as the United States or Finland, has forced academics and industrialists to forge connections. But at the same time, scientists in both sectors have realized that in order to compete internationally, they need to create larger research networks.

STOCKHOLM STRATEGY

One of the key architects of Sweden's new public–private culture in science is Hans Wigzell, who became president of the Karolinska Institute in 1995. In recent years, Wigzell, who is also a science adviser to the Swedish government, has set up Karolinska Innovations to handle technology transfer from the institute, and has also created the Karolinska Fund to provide venture-capital investment.

In addition, in 2000 he helped to establish Actar, a drug-development company based in Stockholm. Actar is designed to help university researchers from across Sweden to exploit any potential drug targets that they identify. And earlier this year Wigzell bought shares in the Scandinavian Clinical Research Institute, a contract research organization that helps small companies to conduct clinical trials.

Hans Wigzell is seeking links with commerce.

KAROLINSKA INSTITUTE

When Wigzell first arrived at the Karolinska Institute, he encountered some resistance to such commercial ties. But he counters such criticism, saying that commercial interactions not only provide non-governmental funds for basic science, but also help to translate basic science into cures for disease. "I think it is unethical for a modern medical school not to support in every way the means to turn its research into practical application," Wigzell says.

Sweden has the highest number of biotech firms per capita in the world — partly because government-funded university scientists are allowed to own all of their intellectual property (see page A9). But this policy may also be limiting the size of these companies, as individual scientists often do not have the resources to grow their firms beyond the scale of small start-ups. This drawback may well be countered by the sheer number of companies in Sweden, which should allow firms to join forces and grow. "We have a great opportunity to link things together," says Wigzell.

To a greater extent, that potential remains to be realized. Unlike the links that

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are being established between Sweden and Denmark, in which the Medicon Valley Academy coordinates activities among companies and the universities in Lund, Malmö and Copenhagen (see pages A24 and A27), northern Sweden has relied on ad hoc personal networking. But that is changing.

GETTING CONNECTED

The Knut and Alice Wallenberg Foundation, a charitable organization based in Stockholm that promotes scientific research and education in Sweden, is starting to take a leading role by setting up and funding initiatives such as the functional-genomics network known as the Wallenberg Consortium North (see "North and South", below). Similarly, the Swedish Foundation for Strategic Research, which supports work in the natural sciences, engineering and medicine, is funding local efforts such as the Stockholm Bioinformatics Center, but it is now looking beyond Sweden (see "Swedish fund branches out", right).

Plans are also being hatched to bring things more closely together at the Karolinska Institute. Wigzell's most ambitious scheme is to turn a disused railway yard in the shadows of the Karolinska campus into a science park, with the help of Stockholm University and the Royal Institute of Technology (KTH) also in Stockholm. He refers to the space, which is close to all three research institutions, as "gold".

Commercial thinking at the institute is not limited to Wigzell's construction aspirations. Since his arrival, for example, Wigzell has made professors at the Karolinska compete for their internal grants, and he has upped the mix of adjunct professors to 61 — a quarter of the total at present — to ensure that students get to interact with faculty members who have one foot in industry or government work.

Jan Lundberg, global head of research and development for AstraZeneca, has taken such interaction one step further. In 1995, he joined the Stockholm-based drug company after 18 years as a professor of pharmacology at the Karolinska Institute. The move, he says, has allowed him to continue working with his ex-colleagues.

AstraZeneca has over 100 university collaborations with Swedish researchers, ranging from funding basic research to testing compounds in animal models for disease, the majority of which are with the Karolinska. "There is a history here," Lundberg says. "People know each other. If they get a new idea, they come to us first." But the balance is delicate. "We don't have the same mind-set and the same goals," says Lundberg.

DELICATE BALANCE

Nevertheless, he says that the fortunes of academia and industry are increasingly becoming tied together in what he calls a "chain of interdependency". For example, lower levels of public funding can indirectly hurt the company, as they may lead academic institutions to rely on private funds. This would shift their research agendas away from basic science, where many of the breakthroughs that fuel drug development are traditionally made.

And academic involvement in industry could go too far — perhaps interfering with the quality of teaching or research that doesn't have immediately applicable goals. "That's one of my fears about the too-radical development of the Swedish university — that it becomes a big biotech," says Lundberg.

But outside money is necessary, argues Claes Wahlestedt, director of the Karolinska's Center for Genomics and Bioinformatics, because national resources have not kept pace with need. Wahlestedt, who left AstraZeneca for the medical centre after five years at the company's site in Montreal, Canada, says that the Karolinska's research budget has kept growing because private funding has increased faster than public funding over the past few years.

Per-Åke Nygren, a biochemist at the KTH's institute for astronomy, physics and biotechnology, agrees that private funds are necessary to maintain basic research. Groups from his lab spun off technology that helped to lead to the creation of companies such as Pyrosequencing in Uppsala, Affibody in Bromma and Creative Peptides Sweden in Stockholm. Those companies have all sponsored research at the KTH at some point, he says.

But Nygren admits that depending too much on this type of funding can be dangerous. For example, in October, Pyrosequencing was forced to cut 25 positions from its headquarters.

UPPSALA INSTRUMENTAL

If AstraZeneca and the Karolinska create a gravitational pull towards Stockholm, then Amersham Biosciences and Uppsala

North and south

The Knut and Alice Wallenberg Foundation, which funds scientific fellowships, research equipment and infrastructure, has in recent years turned to configuring two functional-genomics networks. In 2000, the foundation started SWEGENE in the southwest and the Wallenberg Consortium North. The development of the two illustrates the difficulty inherent in such projects.

SWEGENE, the smaller, more centralized of the two, took off much faster than its northern counterpart, says Erna Möller, executive director of the foundation. "It's probably more difficult to have a bigger network," he says. The three southeastern institutions in SWEGENE will receive 60 million Swedish kronor (US$6.8 million) a year for five years, whereas the seven central and northern institutions of the Wallenberg Consortium will get 100 million kronor over the same time period.

Characteristic of other organizations in Sweden, there is "substantial interaction" between the two networks, Möller says. Möller's own background is indicative of Swedish mobility between sectors and institutions — the former Karolinska Institute researcher still has an active research group there and also sits on AstraZeneca's board of directors. P.S.

Wallenberg Consortium North
wcn.ntech.se
SWEGENE
www.swegene.org

Swedish fund branches out

The Swedish Foundation for Strategic Research, originally established in 1993 to support research in natural science, engineering and medicine, is now spending some of its capital outside the country. In one collaboration with the Academy of Finland, the foundation is supporting bilateral projects under the heading 'Microbes and Man'. The programme will fund joint research projects between Finnish and Swedish researchers studying host–microbe interaction.

The foundation now disperses 1 billion Swedish kronor (US$110 million) a year to researchers, but will reduce that amount to 650 million kronor in 2005 until the fund runs out in 2020. P.S.

The Swedish Foundation for Strategic Research
www.stratresearch.se/eindex.htm

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University have a similar effect on the Uppsala region. But the past five years have seen some uneven trends. On the one hand, employment in the company has risen by 30% since 1997, when Pharmacia Biotech merged with UK-based Amersham Life Sciences.

But after the merger, several employees left to form their own start-ups. Initially, Per-Erik Sandlund, Amersham's global vice-president for operations, was concerned about these departures, but he has since changed his tune. "It's a very positive thing," he says. "We've got to work harder in order to keep our employees within the company."

One way to keep people is by collaborating with academic initiatives. For example, Amersham supplies proteomics instrumentation to some members of the Wallenberg Consortium North and the functional-genomics programme, SWEGENE, based at Lund University in the south.

Such collaborations allow the company to improve its instrumentation by learning about what sorts of scientific goals the universities are pursuing and what sort of obstacles they are finding, says Lars Hagel, director of external research and development at Amersham, and an associate professor of analytical chemistry at Uppsala University.

His ties have also benefited Uppsala University. Together, the company and the university created a medical mass-spectrometry lab, which Amersham uses to improve its machines' diagnostic capabilities. The company is also working to promote protein science by giving out an award, co-sponsored with the Royal Swedish Academy of Sciences, to a young Swedish researcher conducting work in the field.

QUIATECH

Marek Kwiatkowski splits his time between industry and academia.

SPUN-OFF SUCCESS

Many of the spin-offs in Uppsala result from technologies that Amersham found were best suited for exploitation outside the company. Gyros is a prime example. This company aims to use microfluidic channels etched onto the surface of compact discs to conduct biochemical assays. When Amersham scientists developed the technology, "they had no clue as to what they were going to do with it", says Maris Hartmanis, president and chief executive of Gyros. Now the company's investors resemble a 'Who's Who' of Scandinavian science — Amersham and AstraZeneca have shares, as do venture-capital firms HealthCap in Stockholm and BankInvest in Copenhagen. The Knut and Alice Wallenberg Foundation also holds a significant stake.

Research interactions are important to QUIAtech, a firm in Uppsala whose core technology purifies and amplifies oligonucleotides for microarrays. Marek Kwiatkowski, the company's chief scientific officer, is also an associate professor in biorganic chemistry at Uppsala University and the company is housed in a science park on campus. Kwiatkowski, who splits his time between the company's office and his university lab, says that the borders between the two are becoming increasingly blurred, a fact that, much like Wigzell, he believes can only be beneficial.

GYROS

Gyros has benefited from Uppsala's positive climate.

Bengt Westermark, professor of genetics and pathology at Uppsala University, is not sure that this is entirely a good thing. When he was a young investigator, he was "quite suspicious" of collaborating with any company, big or small, he says. Although he admits that he has loosened up in recent years, his concern is that such collaborations will emphasize applied research to the exclusion of more basic work.

Westermark, who will head the Swedish Cancer Society in Stockholm next year, is also concerned that the government will not address the fundamental structural problem that may be driving more people to rely on private money. He says that, overall, grants are too small and end up "fragmented" among too many investigators. He is also suspicious of enforced networks, such as the European Commission's Sixth Framework Programme for research funding, that emphasize large networks of collaborators.

"If you dictate a network, then I fear that within the network there will be groups that are less competitive than others — and some groups will be excluded because of personal relationships or whatever," Westermark says.

His most favoured solution is also the most unlikely — larger project grants akin to those provided by the US National Institutes of Health, which would amply fund a lead investigator, several postdocs and graduate students. Such grants would increase the element of university research that he most values — academic freedom. "If you are wrong, you just change direction," Westermark says.

TOWARDS PARTNERSHIP

More public money — especially for basic rather than applied research — would benefit both the public and private sectors, and mean that academic research universities would no longer need to rely on companies so much, say Lundberg and Wigzell. But few would disagree that the alliances so far created have been largely positive.

Wigzell adds that the increase in funding that has come from companies has allowed some institutions — and even cities — to put aside petty differences. For example, Amersham's impact on bolstering proteomics and instrumentation in Uppsala and AstraZeneca's ties to the Karolinska Institute in drug discovery and development have helped each city to carve out its own identity.

That, in turn, has diminished the rivalry between the two, which are only separated by an hour's train ride. "Uppsala has always felt like the little brother," Wigzell says. But now the two are increasingly looked on as partners in one region, rather than rivals in two. "We are making it together," Wigzell says. ■

Paul Smaglik is editor of *Naturejobs*.

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