

Rising star Northern England



Angel of the North: this colossal statue greets travellers on the road to Newcastle — and perhaps reaches out to the biotech industry's very own 'business angels'.

Northern England was the crucible for an industrial revolution around 200 years ago — although it is a revolution upon which the sun has now set. But in the shadows of defunct textile, coal and steel industries, a new revolution is being forged. At its hub is a cluster of universities, businesses and economic development agencies, drawing in an unprecedented amount of infrastructure investment. The area is vibrant with biomanufacturing, new academic buildings, industrial facilities and incubators. As alliances are forged and investment flows into the region, the north is beginning to build its own version of the southeast's 'golden triangle'.

The southern triangle stretches between Cambridge, Oxford and London and has both history and a certain cachet on its side. For the north, the area is roughly defined by Liverpool, Sheffield and Newcastle upon Tyne — and is bolstered by a combative determination combined with a willingness to work together (see 'Joint efforts', page 432).

But buildings alone won't transform the region. It needs young companies to fill its incubators, in a

period when venture capital is proving unadventurous. And it needs to overcome a general perception that it is an underdog in order to attract top talent to its universities.

NORTH BY NORTHWEST

Travelling the perimeter of the triangle and visiting the institutions along the way reveals that the region is making good progress towards its goals. Manchester makes a good starting point. It is the heart of the current revolution (even if not at the geographical centre) and is in many ways its driving force. Key to the city's scientific rejuvenation is the impending merger of its two universities — the University of Manchester and the University of Manchester Institute of Science and Technology (UMIST) — which is scheduled for October next year (see 'Teething troubles for transferred property rights', below).

Architects of the merger say that they want the combined institution to be greater than the sum of its parts. That expansion is evident in the business plan, which calls for over 100 new appointments, says

Teething troubles for transferred property rights

The succession of power at the soon-to-be merged University of Manchester and the University of Manchester Institute of Science and Technology (UMIST) was easily arranged. Both John Garside, UMIST's principal and vice-chancellor, and his opposite number at the University of Manchester, Martin Harris, agreed to retire within a year of the arrival of Adam Gilbert, who will leave the top slot at the

University of Melbourne, Australia, to run the new entity next February. But another transfer — of two different intellectual property (IP) portfolios and policies into a single unit — may prove to be more problematic and have major bearings on how the new university will create new companies and jobs.

At UMIST, IP is owned by the academics. At the University of Manchester, the

university owns it, but the academics who generate it and the administrators who manage it tend to get a cut. The Northwest Development Agency is trying to steer the new IP office towards the University of Manchester model. The agency will fund the new office with a £30-million (US\$48-million) grant — but may withhold the money if it isn't satisfied with the choice of management or business model. **P.S.**

Michael Grant, pro-vice-chancellor of the University of Manchester. Some of these new positions are likely to be in areas identified for growth by the United Kingdom's Office of Science and Technology, including photon science and neuroscience. Others will come out of a concerted effort to combine UMIST's engineering expertise with the University of Manchester's strength in basic sciences. The merger is creating a chance to "break out of universities that are solely organized around traditional disciplines", says John Garside, principal and vice-chancellor of UMIST.

Perhaps the most tangible example of such thinking is one of the university-to-be's most ambitious building projects, the Manchester Interdisciplinary Biocentre (MIB). Proposed by UMIST in 1998, before merger talks began, the £35-million (US\$57-million), 13,700-square-metre building will house more than 500 scientists in some 85 research groups. They will be working in one of six themes: systems biology; biomolecular and cellular analysis; biomolecular structure and dynamics; bionanotechnology; biophotonics and bioelectronics; and biomaths and biocomputation. "This centre will be home to scientists and engineers from across the disciplines," says John McCarthy, leader of the MIB project. The aim is to make biology more quantitative by bringing chemists, engineers, physicists and mathematicians into the mix.

The MIB is the first of possibly three or more multidisciplinary science buildings for the new university. Proposals for a neuroscience building and photonics facility are advancing through the pipeline.

Other projects already under way are concentrated in a life-sciences hub centred on the current University of Manchester campus. The £18-million Integrated Centre for Molecular and Cellular Biology is due to open in January 2004, although the university is still looking for funds to start construction on its fourth wing. The university's incubator, full after only two years, is to double in size. And in mid-2004, the £22-million Wolfson Molecular Imaging Centre will open at Christie Hospital.

All these initiatives mean that Manchester has changed a lot in ten years, says Mark Ferguson, chief executive of Renovo, a biotech company specializing in wound-healing. When Ferguson was dean of the University of Manchester's biosciences department, he helped to establish the incubator in which Renovo is

now housed. He can prove that being based in the north (which until a few years ago was considered a disadvantage) need not hinder a biotech company from recruiting talent and raising money. Last year, the company raised £23 million in private venture funds in its second round of financing. This summer Ferguson recruited Andrew Kay, former worldwide head of marketing for drug firm Novartis, from Basel in Switzerland.

The building and recruitment boom in the Manchester area is not limited to biotech companies or universities. A cancer-research facility being built at drug company AstraZeneca's Macclesfield site will house 200 scientists, primarily chemists and biologists, when it opens in 2005. The firm has recently invested some \$150 million in the area for upgrades, including more high-throughput screening for potential drug compounds and an automated compound library.

That investment, and the positions it will create, echoes what is happening throughout the northwest. "There are going to be significant job opportunities here for scientists," says John Stageman, AstraZeneca's vice-president for enabling science and

technology. Stageman is also a member of the North West Science Council, the United Kingdom's first regional science council.

One of the northwest's biggest recent coups is securing £30 million in public and private funds in March to build a biomanufacturing centre in Speke, near Liverpool, which will be run by Eden Biodesign, a consultancy that specializes in biomanufacturing.

The plant is intended to employ about 100 people to manufacture biologics, such as proteins, vaccines and antibodies, in small amounts for start-up companies. Its location, just down the road from drug companies Chiron, MedImmune and Eli Lilly, will increase the area's reputation as a hotbed of biomanufacturing employment.

The facility's capacity to manufacture vaccines should complement the region's strengths in immunology, which are also on the rise. The long-established Liverpool School of Tropical Medicine has been expanding since it helped to analyse the genomes of the malaria parasite and its mosquito host last year.

"We're basically building on the back of that," says director Janet Hemingway. The school's staff, 168-strong in 2001, is on course to double by 2006, with increased opportunities for students and postdocs. The expansion is being funded with large-scale grants by



Expanding roles: biotech research at the Liverpool School of Tropical Medicine (right) and at Manchester (above) is helping northern England to build on its scientific strengths.





The Centre for Developmental Genetics at the University of Sheffield has expanded in the past few years.

the UK government, the Wellcome Trust, the Bill and Melinda Gates Foundation in Seattle, Washington, and the US National Institutes of Health. The school is also raising funds for a £24-million addition that would improve its proteomics capabilities.

Liverpool has a history of biology — pro-vice-chancellor Julian Crampton, professor of molecular biology, says that the University of Liverpool devotes about 45% of its resources to biomedical research. But only within the past three years has the university started thinking about spinning out and courting companies. One result of this exercise, the Merseyside Biotechnology Incubator, opened in April and already has three companies inside, with room for 12 more.

The university and its neighbour, Liverpool John Moores University, are also planning a science park, which will have a broader tenant base than the bioincubator. Its headquarters will sit in the shadows of the famous spaceship-shaped Liverpool Metropolitan Cathedral.

Reaching Newcastle, the tip of the northern

triangle, reveals another set of recent and ongoing developments. The £19-million Institute for Research in Environment and Sustainability, which will open at the University of Newcastle upon Tyne late this year, has room for 500 staff. Many will be moved in from other university buildings, but new multidisciplinary positions in environmental genomics and proteomics will probably be filled from outside. There will also be room for social scientists to interact with the environmental scientists. There is no point, says the institute's director Tony O'Donnell, in designing environmentally friendly technologies such as hydrogen-powered cars if the technology is cumbersome or expensive.

That project is joined by continued growth to another young one, the Centre for Life, a facility in downtown Newcastle that, from a distance, resembles a football stadium — until you see the giant metallic spider crawling up its side. The centre combines a children's science museum — with lab benches in different rooms for different heights and ages — with genetics research and a fertility clinic. The grouping is not accidental. The fertility clinic provides embryos for stem-cell research, which can then be studied by the genetics groups — while children can watch the lab scientists at work.

Alison Murdoch, director of the Newcastle Fertility Centre within the Centre for Life, says that the set-up has improved stem-cell science in the city. "Since we've moved, we've developed closer links to the geneticists," she says. That link is important, because the centre is one of the few in the United Kingdom allowed to

Joint efforts

Although many of the developments in the north are centred on single institutions, some of the more ambitious schemes involve multiple players — a strategy necessary to keep up with the south.

One of the largest is Manchester's National Genetics Reference Library, funded by a £60-million (US\$97-million) grant from the health department for the University of Manchester and Christie Hospital to generate a genetic history of all patients over the age of 45 by monitoring them until their deaths. The programme will be run by the local health-service trust and Mark Ferguson, former dean of the University of Manchester's biology department. Getting the grant showed that the north can be competitive against the south.

Meanwhile, several northwestern entities are grouping basic genetics, clinical science and public knowledge under the umbrella of the Northwest Genetic Knowledge Park. They have already raised about £100 million in public funds for a Manchester building, and anticipate the entire project costing about £280 million.

In a different collaboration, David Williams, a clinical-engineering professor

at the University of Liverpool, has set up a tissue-engineering programme between Liverpool and Manchester. Combining the engineering tradition of the University of Manchester Institute of Science and Technology (UMIST) with the University of Manchester's basic-science background and Williams' leadership in the field makes tissue engineering a regional strength, says Julian Crampton, pro-vice-chancellor of the University of Liverpool.

Sheffield, Leeds, UMIST and the University of Manchester have also joined forces to form the North of England Structural Biology Centre to collaborate on nuclear magnetic resonance spectroscopy and X-ray crystallography, two expensive technologies used to solve protein structure. The group is also pushing to build a new synchrotron light source, known as the Fourth Generation Light Source, at Daresbury, as the existing one there is being supplanted by Diamond in the south which goes online in 2006.

The Liverpool School of Tropical Medicine has a history of reaching beyond its walls — a trait that is accelerating now that its funding has increased. The school's staff looks after the infectious-disease ward

at the Royal Liverpool University Hospital and Alder Hey Hospital. The school is also stepping up its private-sector collaborations, spinning out one company and developing and launching a new antimalarial drug with GlaxoSmithKline.

Under the Consortium for Post-Genome Science, the University of Manchester, the University of Liverpool, UMIST, the University of Salford and the Daresbury Laboratory are pooling their resources and competing for grants and sharing expensive equipment such as microarrays, says Andrew Cossins of the Laboratory for Environmental Gene Regulation at the University of Liverpool, and a member of the consortium's bioarray programme. The group's philosophy extends to the entire north. "The region will sink or swim on its ability to pull together rather than relying on single institutions," Cossins says. P.S.

National Genetics Reference Libraries

◆ www.ngri.co.uk

UK Centre for Tissue Engineering

◆ www.ukctc.org

The Consortium for Post-Genome Science

◆ www.postgenomeconsortium.com

North West Genetic Knowledge Park

◆ www.nowgen.org.uk

Web of wonder: the Centre for Life in Newcastle is building strong bonds between genetics and fertility research.



derive embryonic stem cells for research. This group is growing rapidly thanks to the interest it has aroused among students and postdocs, Murdoch says. And John Burn, executive director of the Northern Genetics Knowledge Park at the centre, also expects growth for his team of scientists there — particularly in the research area of genetic instability.

WHITE ROSES

Heading south and east from Newcastle into Yorkshire brings you into the territory of the White Rose University Consortium. The universities of Leeds, York and Sheffield have formed a loose alliance — named after the county's historic emblem — and hope to foster developments equal to those of their counterparts across the Pennines in Manchester and Liverpool. This is where scientists are most candid about their prospects of competing with the south.

Leeds, like many other universities in the north, is focusing on interdisciplinary research and investing accordingly. Construction began this August on a £12-million proteomics centre, strategically placed between the medical school and the biological sciences building. The university is also spending £4.5 million on a bionanotechnology centre.

John Findlay, a biochemistry professor at the University of Leeds, sees this project as a positive start, but argues that in order to attract industry and jobs, the area will have to do more. "The talent is here," Findlay says. "It's just that the traditional investment hasn't been here."

The money is slowly beginning to trickle in. York's science park, open for only six months, is filling up with small companies. One of these, Xceleron, which uses its own accelerator and mass spectrometer to help big drug companies to characterize 'lead' compounds and targets, is now looking for more nuclear physicists to assist in running its machinery. Colin Garner, the company's chief executive, is also looking for a clearer sense of leadership for the greater-northern region. A group of at least half a dozen organizations is trying to pull the area together, but he thinks that more centralization will be necessary.

Some drive could come from the few larger companies located in Yorkshire. York-based medical-device company Smith & Nephew is providing some

by funding studentships at the University of York and fostering research collaborations there.

Peter Arnold, director of technology at Smith & Nephew, says that many people have preconceptions about the medical-device company, just as they do about the state of science in northern England. Medical-device research is now much more high-tech than it once was, he says, as it now focuses more on tissue engineering and materials science than on clunky plastic orthotics; 120 of the site's 180 employees hold PhDs.

In nearby Harrogate, another large company is also hungry for freshly minted PhDs. Within the past year Covance, the global contract research organization, opened a new animal-research facility there, and the firm has since been searching for scientists interested in conducting preclinical research.

In Sheffield, meanwhile, the building work is just beginning. The European Regional Development Fund is pouring £11 million over three years to develop biology. The South Yorkshire Bioscience Enterprise Network is planning an incubator, and a steady stream of spin-offs from both the University of Sheffield and Sheffield Hallam University could help to fill one.

Despite all of the progress, some of the old prejudices remain. For example, some venture capitalists funding a spin-off from the University of Sheffield urged the company's management to move its base south.

Phil Ingham, head of the biomedical science department and director of the Centre of Developmental Genetics at the University of Sheffield, says that much has changed since he was recruited in 1996 from the Imperial Cancer Research Fund (now part of Cancer Research UK) in London. He was able to raise £30 million to gut, restore and transform one of the university's oldest buildings into one of its most state-of-the-art. He has also expanded the staff from eight principal investigators when he started to 12 now, with more growth in sight. Even so, he says, it will take further effort to gain the respect that more prestigious institutions in the golden triangle have. But he sees progress, nonetheless.

"We're going places," Ingham says. Anyone who has driven around the triangle will have seen that the whole region is already on its way. ■

Paul Smaglik is editor of *Naturejobs*.