Germany bites the biobullet

Life-science companies are being set up in the federal republic as never before. With cash aplenty, the hunt is on for the qualified workforce

EVERYBODY’S talking about the revolution. Germany, the country once known as the place that shunned genetic engineering, is now one of the leading lights in Europe’s biotechnology industry. In the space of five years, it has transformed itself from a biotech backwater to a Mecca for entrepreneurs and venture capitalists eager to grab a slice of the action.

But it’s just not biotech that is changing. Academic science is being overhauled to reverse the tide of young scientists leaving Germany to seek their fortune in the US. The somewhat cumbersome university system is getting a makeover to encourage students to stay in science. Both international and interdisciplinary collaboration in scientific research are encouraged.

"There is no 'German' science - we are all international now,” says Jens Frahm, a neurobiologist at the Max Planck Institute (MPI) of Biophysical Chemistry in Göttingen.

Not that Germany has forsaken its traditional strengths such as IT and engineering, says Hartmut Runge of Siemens. "We are in a very good position worldwide,” he says.

1: Martinsried - jewel in Germans’ science crown

THEY call it the Bio Grande. Thirty years ago, it was just a little farming village. But now Martinsried is the jewel in Germany’s biotechnology crown, located in the south of Munich - a magnet for venture capitalists and start-up companies eager to set up shop in Bavaria’s Gene Valley.

Home to a cluster of 52 biotech start-ups, the key to Martinsried’s success is the critical mass of world-class research in the area, according to Horst Domdey, CEO of BioM, a company that provides free advice and seed capital to would-be biotech start-ups - in return for shares. In Munich alone, there are eleven MPIs, two universities and two university hospitals, the National Centre for Environment and Health (GSF) and the Gene Centre. BioM was founded in 1997 to coordinate the funding from the BioRegio initiative and foster the growth of fledgling biotech companies, as well as help bridge the gap between academe and business.

The key to the establishment of the Martinsried cluster was the foundation of the Innovation Centre for Biotechnology (IZB), set up in 1995 by the regional government of Bavaria, in collaboration with the administrative district of Munich and the county of Planegg.

Its brief is to provide a bridge from research to a market-oriented centre for new enterprises. New companies can rent lab and office space in the centre, which boasts 8500 square metres of space. With the current boom, all the space is occupied, and together with the Bavarian Ministry of Economic Affairs and the city of Munich, BioM has found space to accommodate the short-term demands of rapidly growing companies.

And it’s not just biotech companies that will be needing space. The University of Munich is in the process of relocating its life-sciences campus there. The prospect of close collaboration between industry and the universities can only add to Martinsried’s attraction for companies and students alike. Are the employment opportunities there in Munich? “Absolutely,” says Domdey, “We’ll need at least 1,000 scientists and 700 technicians in the next two years.”

Hot areas include software engineering, mobile telephone technology, clean energy and new transport solutions. Runge believes that the combination of history, a good education system, a highly trained workforce and innovative industry is the key to Germany’s continuing success in this field.

But the biggest story in German science now is the dramatic turnaround in biotech industry. It’s not just the speed at which companies are springing up that is remarkable, but also the shift in public and political attitudes that was once prohibitively suspicious of anything to do with genetic engineering.

In the late 1980s, pharmaceuticals giant Hoechst fought in vain against public opinion and local regulators to set up a factory to make recombinant insulin. At that time, Germany had a stricter genetic-engineering law that laid down conditions for obtaining a licence to do any recombinant DNA work. What’s more, the Green party had an aggressively anti-genetic-modification stance. That meant that biotechnology and pharmaceuticals companies turned their backs on Germany and headed for the US.

"With the first wave of genetic engineering we lost ten years, because things were politically repressed," says Hans-Joachim Fritz, head of molecular genetics and molecular biology in the microbiology faculty of Göttingen University.

Today, things could not be more different. Germany is now forging ahead of the rest of Europe in terms of the number of biotech companies being founded, with both the federal and regional authorities actively encouraging biotech start-ups. Venture capital companies have flocked to a country that was once famed for its conservative and bureaucratic approach to enterprise, particularly in the biological field.

"From my perspective, 10 or 20 years ago, gene technology wasn’t
Once you have a good idea, you will have every chance to try it.

Hans-Joachim Fritz, head of molecular genetics and molecular biology, Göttingen University

The publicity surrounding the human genome project is probably largely responsible for changing public attitudes to genetics. But the change of heart is by no means complete: although there is widespread acceptance of genetic engineering in the biomedical field, engineering plants for agriculture is deeply unpopular, making life hard for agrobio tech firms. “There’s a very solid acceptance of molecular biotechnology, at least in the concept of healthcare,” explains Fritz.

Biotech revolution

Many scientists feel that Germany’s lack of pragmatism when it comes to dealing with new or controversial technologies is another reason why it is scrambling to catch up. While other countries forged ahead, Germany got bogged down in endless philosophical discussions about the ethics and implications of the issue. But once the Germans decided to bite the biotech bullet, there was no stopping them.

The spark that catalysed Germany’s biotech revolution was a federal government scheme called BioRegio. Launched in 1995, the scheme was the brainchild of the then science minister Jurgen Ruttgers, and offered first dibs on sponsorship from the government’s national biotechnology programme for 5 years for regions who came up with the best plans to integrate research and commercial exploitation. The scheme offers to match the venture capital provided by private sources and has given the German biotech industry a big kick-start.

In total, 17 so-called BioRegions entered the competition, with the three winners being BioRegion Munich, BioRegion Rhein-Neckar Triangle, which includes Heidelberg, and BioRegion Rhineland, which
"It was difficult to get scientists here. But the Munich biotech companies are fuelling a flood of job opportunities"

Wolfgang Baumeister, director of structural biology and managing director of the Max Planck Institute of Biochemistry

includes Cologne. The competition has proved to be a great success, prompting an avalanche of new companies. "It revolutionised the whole scenery," says Superti-Furga. In 1997, Germany had 173 core biotech companies, 98 of which were small and medium-sized enterprises created between 1996 and 1997. By the end of last year, it was home to a total of 332 entrepreneurial life science companies, or ELISCOs, and now leads Europe in terms of sheer numbers.

And there is certainly no shortage of money to fuel this expansion. More money is now available to support the sustained development of young biotech companies in the form of the federal Bio-Chance programme. State governments are also chipping in with money for local ventures. The new political will to change things means changes in regulations as well as new money. It is now possible for a company to float on the stock market while still in the red, and regulations are being eased to facilitate licensing of technologies. Universities are getting more freedom over their finances, making it simpler to set up technology-transfer companies and biotech institutes. "Once you have a good idea, you will have every chance to try it," says Fritz. According to analysts Ernst and Young, some 2.3 billion euros of venture capital were available to biotech start-ups in 2000 - nearly double the previous year's quota. All this makes Germany an attractive location for investors and entrepreneurs. "With the state support, Germany definitely offers advantages," says Gábor Lamm, managing director of EMBLEM, the European Molecular Biology Laboratory's (EMBL) enterprise management technology-transfer company in Heidelberg.

The leader in Germany's biotech boom is the state of Bavaria, in particular the cluster of biotech companies and research centres in Martinsried, a small village located to the south of Munich (see Box 1). Close collaboration exists between these research centres and biotech companies. For example, the MPI of Biochemistry, the second-largest in the Max Planck Society, was the nucleus for formation of the Martinsried biotech cluster. It now leases land to biotech companies and offers in-house expertise and facilities to firms on the campus. Thirteen of the biotech companies are spin-offs from research at the MPI. And the benefits work both ways - MPI researchers see their basic research translated into real applications. What's more, the thriving research and commercial community promises to attract good PhD students with the prospect of jobs in the biotech sector. "At first, Martinsried was a desert," says Wolfgang Baumeister, director of structural biology and managing director of the MPI of Biochemistry. "It was difficult to get scientists here." But the Munich biotech companies are fueling a flood of job opportunities for scientists, with the region's workforce growing from 300 in 1996 to over 2500 today.

"We were rather early compared with other places," says Horst Domdey, CEO of BioM. Unlike some other commentators, Domdey doesn't think the biotech boom is snowballing too fast. "The velocity is not too high," he says. Germany's labour laws and practices make it harder for them to grow as fast as their American rivals. Certainly, it won't be easy to introduce the American hire-and-fire mentality
BREAKING the language barrier is a driving force behind one of Germany’s newest science innovations - the International Graduate Schools. As well as offering MSc and PhD training, the schools do all of their teaching in English, the global language of science. As well as encouraging international students to come to Germany, universities are hoping to stem the tide of German students going abroad to learn English.

A number of universities, including Heidelberg, Cologne and Tübingen are now running or setting up such schools. Two new institutes in Göttingen, the Göttingen Centre for Molecular Biology and the European Neuroscience Institute, are both hosting four-year programmes in association with the University of Göttingen, the MPI of Biophysical Chemistry, the MPI of Experimental Medicine and the German Primate Centre. The concentration of world-class science at these institutions is a lure for prospective students, says programme coordinator Steffen Burkhardt. What’s more, the course structure of lab rotations and a high teacher to student ratio ensures a thorough and broad training, he adds. “We encourage a wide background.”

Unlike many German universities, which often demand a master’s qualification, it is possible to join either programme with a first degree. Students complete a mandatory first year of intensive teaching and three lab rotations. Then they can either continue for a master’s degree, or go straight into the three-year PhD programme. Students with good grades can choose the lab in which they wish to do their PhD.

The programmes have been running since 2000 and are a big hit with the students. Christian Rochford, who comes from Ireland, is just completing his first year of the neuroscience programme. “There’s a lot of good science going on,” he says. And the professors take a real interest in what people are doing.” He is very happy with the level of teaching, and with the opportunity to try out different research projects before committing to a particular PhD. Sponsors and potential employers are watching the programme closely, but their response so far has been very positive, says Burkhardt. “All the letters from industry are saying: ‘We think this is a great idea’,” he says. “They think it should have been done 10 years ago.”

No barriers

Opportunities aren’t just confined to entrepreneurs and investors. Germany is generating far more vacancies for bioscientists than it can fill. Qualified technicians are particularly hard to come by, according to many lab heads. As the majority of German scientists are fluent in English, language is no barrier to non-German speakers working in labs there. However, a reasonable command of German is needed to cope with everyday life in the country. Other potential employers include the European Patent Office in Munich, which is looking for scientists, especially biomedical scientists with a good grasp of French and German.

But though the wealth of opportunities in biotech companies might encourage students to stay in science, Germany still has to maintain a competitive basic research base to spark innovation. The country faces a brain drain to the US due to the lack of opportunity for young scientists to become independent researchers early in their careers. In German universities, experienced postdocs normally have to work for their professor and write a thesis before they can set up their own lab. This “habilitation” can take years, and means that German scientists commonly aren’t independent until their forties. “It’s a very old-fashioned system, and very hierarchical,” says Thomas Tuschl, a young researcher who has just established his own lab at the MPI of Biophysical Chemistry in Göttingen.

Awards from the German Ministry for Education and Research are one example of generous grants established for outstanding young scientists trying to fight this trend. These are modelled on the Junior Group scheme of the Max Planck Society. The aim is to encourage postdocs back into the fold by offering them up to DM3 million over 5 years to set up on their own. “That’s fantastic, it’s the best starting grant you can get, probably anywhere,” says Tuschl.

University teaching is also being overhauled. A number of international graduate schools have been established to compete more effectively with foreign institutions. Their key innovation is that teaching is all actively with foreign institutions. Their key innovation is that teaching is all

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