



CATALONIAN POWERHOUSE

Approaching Barcelona by plane over the azure Mediterranean Sea offers breathtaking views. The city's beachfront and landmark skyscrapers reveal why the proud capital of Catalonia has become a major tourist destination. And in the midst of that vista, the omega-shaped complex of the Barcelona Biomedical Research Park (BBRP) not only complements the city's architectural style, but signifies the city's growing ambitions in science.

Spanish science stagnated under a 40-year right-wing dictatorship followed by 30 years of, at best, timid reforms. But from 2004, the newly elected Socialist government increased science funding by 60% and started tackling the bureaucracies that obstructed change and froze out new young talent (see *Nature* 451, 1029; 2008). The government emphasized its commitment after re-election earlier this year by creating a science and innovation ministry, led by biologist Cristina Garmendia.

Barcelona in the lead

The Autonomous Community of Catalonia, always one of the most industrialized regions of Spain, was way ahead. The national funding windfall expanded the regional government's science initiative, launched in 2003, which set up 30 new institutes. These institutes are all public-private foundations, mostly covering aspects of the life sciences, and nearly all are located in and around Barcelona. Catalonia was also ahead of the game when it tackled the laws that promoted 'inbreeding' — which used to allow universities to favour local and internal candidates, leaving little room for newcomers or young people. Catalonia's financial contribution to science has grown dramatically since 2003, spending €2 billion (US\$4.7 billion) during 2005–08.

The BBRP, for example, is just one of Barcelona's three thriving science parks. A joint initiative of the

Spain is revitalizing its science base, with Barcelona surging ahead as a Mediterranean science hub, reports **Quirin Schiermeier**.



The Barcelona Biomedical Research Park attests to the city's ambitions in science.

Catalan government, the city council of Barcelona and Pompeu Fabra University, it opened two years ago. It now houses the Centre for Genomic Regulation (CRG) and five other public research institutes. Some 80 BBRP groups study a broad variety of topics, from stem cells to computational biology. And in a way that could hardly have been imagined 10 years ago, all these groups and institutes are flourishing with international personnel and collaborations, aided by increased salaries and a loosening of traditionally restrictive Spanish recruitment policies.

The CRG now has 28 groups with 10 more teams yet to be recruited, eventually rising to some 400 scientists. It is modelled on the lines of the European Molecular Biology Laboratory (EMBL) in Heidelberg, Germany, with which it now has a systems-biology collaboration. Like EMBL, the CRG encourages movement by giving group leaders five-year contracts with a maximum four-year extension. It always has an eye open for talented PhD students and postdocs from Europe and elsewhere.

"In the past five years, Barcelona has turned into a premier location for biomedical research," says Luis Serrano, the former head of EMBL's structural-biology programme, who is now in charge of the CRG's systems-biology unit. He says the city has a "California spirit" — an attractive location and a strong international science base — that has helped attract scientists and technicians to the centre's core genomics and proteomics facilities.

The city's other science parks are thriving too. The Barcelona Science Park, next to the University of Barcelona, opened in 2003 and has about 1,000 scientists, mostly in the life sciences. Its Institute for Research in Biomedicine has just set up an oncology programme, for which it is now recruiting group leaders and researchers. The Autonomous University of Barcelona's Science and Technology Park, which

officially opened in 2007, houses research institutes and companies in fields ranging from agro-technology, health and life sciences to physics. At full capacity, it will house more than 1,000 scientists and staff.

Computational power is also increasing. The Barcelona Supercomputing Center houses one of the world's most powerful computers — the MareNostrum, which can do 94.21 trillion operations per second — in what used to be the chapel of the University of Barcelona (pictured opposite). The computer is used for a range of research including protein dynamics, drug testing and modelling in Earth sciences. Meanwhile, the €120-million ALBA Particle Accelerator, funded jointly by national and Catalan governments, is being built near Bellaterra, just outside Barcelona. When it comes online in 2010 it will be deployed in areas such as structural biology and materials research and will have a staff of 100, including technicians, researchers and graduate students.

Wanderers welcome to return

One major advantage Catalonia has over other Spanish regions is the ease with which institutions such as the CRG can hire talent from other countries. This results from initiatives put into place by Andreu Mas-Colell, an economist who served as Catalan minister for universities and research from 2000 until 2003. Traditionally in Spain, as in several other European countries, professors have been appointed by the education ministry in charge, not by the university department. (Universities were recently placed within the country's new Ministry of Science and Innovation; see page 147.) Salaries are kept at modest levels, making it hard to compete for talent. Often Spanish universities do not even recognize foreign degrees; they may require a candidate — even one with a degree from a prestigious institution — to take additional tests. This often means Spanish universities hire natives first; it also means that Spanish scientists who go abroad for postdocs can have a hard time returning. Mas-Colell's framework for the 30 new institutes enabled them to hire internationally, without having to ask the government for permission.

"Things have indeed developed very well," says Mas-Colell, who will next year take over as president of the European Research Council (ERC) in Brussels. He notes that some initiatives first tried in Catalonia are now being copied in the Basque country and elsewhere in Spain.

Like its predecessors, the current regional government coalition, led by the Catalan Socialist Party, has put money and thought into supporting science. But the past few years' growth rates of Spanish science budgets — on both national and state level — cannot be maintained forever, says Mas-Colell. He is confident, however, that the new centres are already maturing: "I hope that the system is already strong enough for maintaining in the future what we have achieved in the recent past."

Public perception and support are important, given the extra money being spent. "Spanish society has clearly changed its mind about science," says Lluís Torner, director of the Institute for Photonic Sciences (ICFO) in Barcelona, suggesting that the country has

shaken off its previous apathy. Like the CRG and other new centres, the ICFO has rapidly expanded since its creation in 2003. Its 15 groups — including around 60 postdocs, 80 graduate students and senior scientists from Germany, the Netherlands, France, Britain and Spain — research photonics for applications in biomedical and environmental sciences. Optical devices developed at the ICFO include tools for medical imaging, environmental sensors for pollution, and research into quantum computing and solar energy. A spin-off company, Radiantis, set up in 2005, markets advanced tuneable and wavelength-conversion laser systems for a variety of applications including spectroscopy, photochemistry and quantum optics. By 2011, the ICFO will have some 300 researchers, according to Torner. "We have

several openings for group leaders, and we can offer excellent conditions to young scientists who wish to become independent and run their own group," he says. The attractiveness of Barcelona as a city of science, culture and sandy beaches does help, he adds. "But we do know, of course, that our competitors in Munich, Amsterdam or Paris can offer good conditions as well."

Gathering grant-winners

Another sign of Catalonia's success is the number of ERC starting grants awarded to young investigators based in and around Barcelona. Of the 24 Spain-based scientists who have won one of the 300 or so grants awarded in the first round earlier this year, 15 are working in Catalonia. In fact, Catalonia has been one of the most successful regions in Europe for ERC awards. "You need someone to bet on you," says Joan Seoane, a cancer researcher at Barcelona's Vall d'Hebron Institute of Oncology, who was awarded a five-year, €1.5-million ERC starting grant for his research on molecular mechanisms involved in brain-tumour formation. "This grant gives me enough security to try something a bit more ambitious"

Seoane's return to his native Barcelona in 2004, after five years at the Memorial Sloan-Kettering Cancer Center in New York, was supported by the Catalan Institution for Research and Advanced Studies, a foundation set up in 2001 to consolidate a group of high-level scientists of all origins. The institution has so far hired some 200 high-profile researchers on a permanent basis.

"There's just a lot of effort in Catalonia to attract people from abroad," says Seoane's wife Luisa Maria Lois, a plant molecular biologist at Barcelona's Centre for Research in Agricultural Genomics. "That's very good for us because it allowed us to come back."

In a welcome coincidence, Barcelona-born Lois, who had been at New York's Rockefeller University, learned just days after her husband that she too had won an ERC grant: a five-year, €1.1-million grant for her research on protein regulation of plant responses to environmental stress. "Returning to Barcelona was something we thought would be difficult," she says. "Now this grant has totally changed my perspective, allowing me to build up a competitive research team. That's more than national agencies can offer."

Quirin Schiermeier is Nature's Germany correspondent.

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Joan Seoane (top), Luisa Maria Lois: returning to Barcelona on ERC awards.