Spanish company PharmaMar searches the sea for new cancer drugs.

PHOTO COURTESY OF PHARMAMAR

# Spain's Biotech Revolution

In the past five years, Spanish companies and institutions have sharply increased their focus on biotechnology, and the results —in new companies, new products, and new research centers—represent an important contribution to the growing international field. This is the sixth in an eight-part series highlighting new technologies in Spain and is produced by Technology Review, Inc.'s custom-publishing division in partnership with the Trade Commission of Spain.

In conversations about biotechnology in Spain, one word appears repeatedly: revolution. According to many in the field, huge changes are afoot in Spanish science today. Though the country has historically focused on producing quality scientific research and papers, the past five years have seen a dramatic increase in the launch of companies, the development of new research centers, and the transfer of top-quality technology into economic development.

Both the national and local governments have embraced the current European focus on developing a knowledge-based economy, one that creates companies—and income—from the ideas of its citizens. National and local governments have increased funding for research, created new research centers, and provided mechanisms to advance technology transfer. Though this focus is relatively new in Spain, the strong scientific environment has provided a rich medium for the rapid growth of biotechnology, which has seen intensive investment and development in the past five years. According to Genoma España, a government-funded organization that promotes genomic research and practical applications, half of all scientific research in Spain focuses on biomedicine.

## Starting Up

The seeds of the current revolution were planted at the National Center for Biotechnology (CNB in Spanish), located on the outskirts of Madrid. For the past 15 years, CNB has housed and promoted top-quality science while simultaneously focusing on technology transfer and spinoffs. Eleven companies so far have sprung from the CNB labs. At 720 researchers, CNB is the largest center of the National Research Council—and the first to focus so intensively on technology transfer. "For instance, we were the first center

to have our own technology-transfer office," says CNB's director, José Ramon Naranjo.

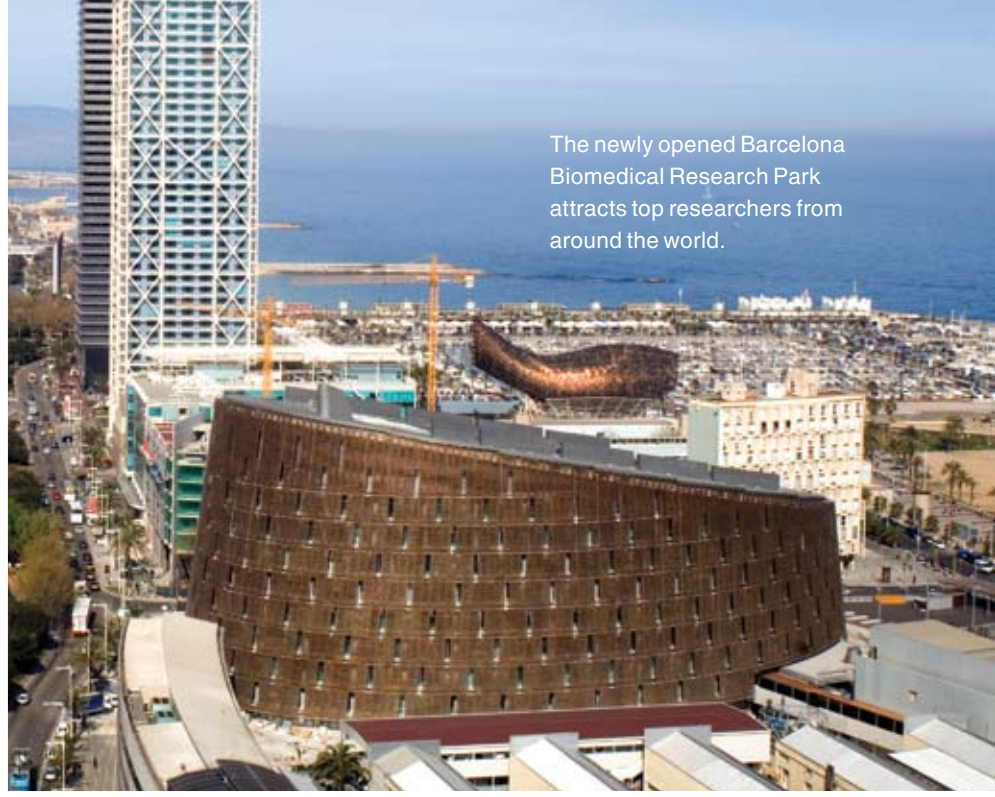
The departments cover a wide variety of topics: researching viruses and developing vaccination protocols; analyzing microorganisms for their potential in bioremediation; studying pathogens and their mechanisms of disease production in order to develop new antimicrobial compounds; studying species of wine grapes to understand how the plants produce defenses to cope with viral attacks or lack of nutrients.

One group at the center recently developed a method for studying the genome of a pathogenic salmonella strain (previously only a nonpathogenic strain had been studied) in order to better understand its virulence. Another company on-site is working on a landmine detection system based on the ability of certain bacteria to eat explosive compounds. These bacteria have been manipulated to glow at night if they are "happy," as Naranjo explains—"and they're happy when they're eating this compound."

Though the salaries of researchers are paid by the Spanish government, the research itself is funded by grants from around the world. The center recently won a grant from the Bill and Melinda Gates Foundation for its work as part of a consortium developing an HIV vaccine.

This type of work is representative of much of the top biomedical and biotechnology research going on around the country. Spain has a strong background in research: the country has historically produced a significant percentage of the papers published in scientific journals from European research centers.

Manel Esteller, director of the Spanish National Cancer Center (CNIO in Spanish), is one of the first Spanish scientists to land on the pages of the *Wall Street Journal*. His research on monozygotic twins (who share the same DNA) and cancer, and how aging and environment affect DNA and the incidence of cancer, has broad implications for treatment and management of the disease.



The newly opened Barcelona Biomedical Research Park attracts top researchers from around the world.

At the Institute for Photonic Sciences, researchers shed light on puzzling questions in biology today.

The strength of Spanish research has drawn international companies to set up research facilities in the country. Pharmaceutical firms including Merck, Lilly, Abbott, and Baxter have developed labs in Spain. The French pharmaceutical company Sanofi-Aventis is currently investing nearly eight million euros (about $10.5 million) in a new basic-research center outside Madrid.

The CNB's focus on technology transfer had been historically rare in Spain. In the past, there had not been much interest in patenting discoveries, or in transferring knowledge to companies that could develop and market the resulting technologies and profit from the research.

"We've produced about 4 percent of papers on biotechnology in the world, and we're the fourth country in Europe in terms of those publications, but we've been at the back of the line in terms of patents," says José Luis Jorcano of Genoma España.

The organization primarily provides funding for major research programs, such as one, in conjunction with Genoma Canada, studying fish metabolism and changes in the expression of

BOTTOM PHOTO COURTESY OF ICFO-THE INSTITUTE OF PHOTONIC SCIENCES; PICTURE BY LUIS MONTESDEOCA

TOP PHOTO COURTESY OF PRBB

genes at different points in fish development. This knowledge serves to better map fish development and ascertain what foods best meet fish needs and at what times—all for more efficient and effective aquaculture.

"We fund a number of genome projects studying plants, fish, and animals, because when you look at exports from Spain, a large portion of them are from agriculture," says Jorcano. Like CNB, Genoma España also provides funding and assistance for spinoffs.

share office and lab space and have access to expensive equipment that would usually be out of financial reach at this early stage. In addition, the arrangement provides them with administrative assistance in developing their businesses.

The most advanced research is led by Victor Rosas, head of Decantum Systems. Rosas has spent decades in academia developing a food safety test that quickly separates, for instance, fats and proteins in an animal's liver. The tests,

for Applied Medical Research (CIMA) pairs university research centers with an applied-pharmacology investigation center, a hospital with a department for clinical trials, and a private company to develop new products and bring them to market.

In all, Spain has about 25 functioning science and technology parks, with about 45 more in development—and literally thousands of companies working in a wide variety of scientific fields have been incubated in these parks or

**"The types of science parks here in Spain offer a new physical space to create better relationships between universities and companies."**

But many of the organization's efforts have involved tracking the growth of the biotechnology sector over the years. There have been dramatic changes. In a recent study, Genoma compared Spain against other European countries, the United States, and Canada. After adjusting for population and income levels, the study found that though Spain's sector is still relatively small compared to the big international players, it is the fastest growing. In the last two years, the number of companies solely devoted to biotechnology has increased by 40 percent. On average, public and private investment in biotechnology is growing at 22 percent and 32 percent per year, respectively.

Bioincubators provide one method for promoting the growth of these new biotechnology companies. On the same campus as CNB, a bioincubator at the Madrid Science Park hosts companies in early stages of development.

The Madrid Science Park (PCM in Spanish) was created in 2001 to promote technology transfer from the academic to the private sector. "These types of parks here in Spain offer a new physical space to create better relationships between universities and companies," says its director, Antonio Díaz. There are already more than 45 companies in the park.

At the moment, eight biotechnology companies line PCM's halls. With only a few employees each, the companies

which can also detect illegal substances, are significantly less expensive and exponentially faster than techniques used today in food safety. The company is already selling the first kits to a handful of regions in Spain before beginning to market them internationally.

Another regional bioincubator officially kicked off in the Basque region five years ago. Actively promoting company creation, the local authorities set up new biotechnology research centers, with top-of-the-line facilities in genomics, structural biology, and many other related fields. Though the area does not have a long history in biological research, as is the case in Madrid and Barcelona, its rich history in engineering and manufacturing provides the basis for the government's recent push to expand into biology.

"We can use our know-how and expertise to create biosensors, or robotics and automation for biology, which is what some of the companies are involved in," says Maria Aguirre, head of BioBask, the government agency in charge of the effort. In the last four to five years, she adds, a new company has been created, on average, every three months. Sixty companies are already part of the initiative, and the Cooperative Research Center (CIC bioGUNE), a multidisciplinary center to advance research in biology and health, opened last year.

At the University of Navarra in Pamplona, a new project called the Center

spun off from them. This model itself has become a Spanish export. Brazil, Chile, Mexico, Argentina, and some countries in Eastern Europe have expressed interest in creating similar centers.

### New Bioregion

Though Madrid has traditionally been the center of gravity for Spanish scientific research, Barcelona today practically buzzes with energy about biomedical science. New research centers have sprung up around the city in the past few years. Investment in biomedical research continues to climb. There's a new focus on training professionals to deal with the details of technology transfer: filing patents, raising funds, running a business.

The organization Biocat, the BioRegion of Catalonia, was created as a way to formalize this effort; it's a government-funded umbrella organization that unites government, business, and academia to facilitate research, technology transfer, and business creation. "We realized that here in Catalonia, we're great at creating knowledge," says Manel Balcells, the president of Biocat. "But we need to improve in technology transfer, in taking that knowledge and converting it into economic value."

New scientific resources in the region have added both to the scientists' capabilities and to the excitement. The

fourth-most-powerful computer in the world—the most powerful one devoted entirely to science—is located near the Barcelona Science Park (PCB in Spanish). PCB is home to southern Europe's most powerful nuclear magnetic resonance imaging machine, which is used to determine molecular structure. And a new synchrotron—a sprawling, high-energy particle accelerator—is under construction just on the other side of Barcelona's mountains.

Much of the research done by Spanish pharmaceutical companies has historically been based in this city. Barcelona's hospitals conduct research in addition to providing care. And the universities have contributed to the base of knowledge about biological processes.

PCB, which is located on the University of Barcelona's campus near the city's fabled soccer stadium, opened in 2000. In addition to a number of research institutes on site, PCB also houses more than 30 companies in various stages of development, including three oncology labs of Merck Germany.

The largest of the on-site institutes is the Institute for Research in Biomedicine (IRB Barcelona). In one lab researching peptides and proteins, headed by Ernest Giralt, researchers are examining how different molecules "talk" to one another and how proteins recognize each other. The goal is to develop molecules that can prevent the development of certain diseases, such as Alzheimer's. Another team, headed by Antonio Zorzano, investigates antidiabetes compounds and examines the role of mitochondria in preventing disease.

"We are competing against the whole world," says Zorzano, "so what we have to do is try something new, not just research what's obvious. And we're very excited here at IRB Barcelona about where the science is going. In Spain we're no longer focusing just on publishing. It's about doing something else for society, and for the whole world."

That excitement was what drew Lluis Ribas de Pouplana back home to Spain, and to IRB Barcelona. He'd been in the United States at the Massachusetts Institute of Technology, then at the Scripps Research Institute in California. "One of the parameters for where I wanted to work was how easy it would be to start a spinoff," says Ribas de Pouplana. "Barcelona—and the IRB—seemed to be a great place to go." Ribas de Pouplana has developed a company to capitalize on his research, using human tissue samples to test drugs for positive characteristics rather than relying on time-consuming tests that individually knock out drugs on the basis of negative characteristics. This technology has the potential to dramatically shorten the time needed for testing pharmaceutical compounds.

The Barcelona Science Park and IRB Barcelona exemplify the growth in the region. The PhD program attracts international students, and scientists from different departments wander freely among the various labs, exchanging ideas, continuing research, and innovating. New buildings are under construction.

Across town, at the new Institute of Photonic Sciences, projects shed light on some challenging questions in biology today. One team, led by Dima Petrov, designs optical tweezers that can hold a cell in place, suspended in liquid, and then uses the same beam or a different laser source to perform chemical analyses of the cell. The result is a brightly colored visual display of the chemistry of a cell in situ. This novel technique can be useful in studying blood cells, which are best understood in suspension; it can help reveal, for example, the mechanism and location of drugs entering those cells.

Another team is at the early stages of using light to encourage neuron regrowth. "The problem is that neurons do not regenerate," says Pablo Loza-Alvarez, who heads the team. "If a neuron is broken, from a degenerative disease or from a spinal-cord accident, there's no way to repair it. We're at the very beginning of tackling this problem."

The team has demonstrated that neuron filopodia—the sensors at the end of the cell—will actually grow toward the pulse of a special laser. This is the first time this technique has been applied to live neural cells. "These are the beginning stages, but this approach is opening a completely new path of research that could help a lot of people," says Loza-Alvarez.

**"We want to revolutionize biomedical research. When different disciplines get together, you create innovation."**

In one of the most promising new technologies, Romain Quidant heads a team that uses light to provide the structure and power source for the elusive lab-on-a-chip. Light, focused by specific properties in gold, becomes strengthened and magnified. This strengthened light can serve to push molecules on a chip and trap molecules of certain sizes and shapes. This way, a solution could theoretically be broken up into different compounds. Then that same energy source, light, could be used to analyze the chemical components of the compounds.

"This small piece would include all the functionalities needed to perform, for example, an analysis of drugs or blood," says Quidant. "From a small quantity of liquid you could separate out different elements, manipulate them, analyze them, and do it all in parallel. This is something that could end up cheaper, faster, and more reliable."

By far the most visually arresting scientific building in Barcelona claims a prime location overlooking the beach along the city's Mediterranean coast. Opened in May 2006, the Barcelona Biomedical Research Park (PRBB in

PharmaMar researchers dive at sites around the world to collect samples.

At PharmaMar's labs, samples of sea life are tested for their ability to combat tumor growth.

Spanish) is the region's newest and largest facility devoted entirely to biomedicine.

The beachfront property has space for 1,000 scientists, making it among the largest research centers in Europe. More than 80 research groups attract scientists from around the world, covering topics such as bioinformatics, gene regulation, cell and developmental biology, and research on embryonic and adult stem cells. In fact, this center is the first in Spain to work with embryonic stem cells.

The building will also house clinical trials on-site, one unusual aspect of the research. "We believe it's good to make the basic scientists understand that there is time pressure," says Reimund Fickert, project director at PRBB. "We want the medical doctors to interact with them. They should know there are people dying, and that the basic research is related to a medical necessity."

Like the other new research centers, PRBB focuses on interdisciplinary research and encourages interaction among scientists. Says Fickert, "We want to revolutionize biomedical research. When different disciplines get together, you create innovation."

## Answers from the Sea

In the lobby of PharmaMar, a biotechnology company on the outskirts of Madrid, neon fish dart through a coral-filled aquarium. On the walls hang dramatic photos of underwater creatures. These visuals highlight a relatively unexplored terrain in biomedical research: the sea. PharmaMar's research offers a tantalizing glimpse at this new frontier in medicine.

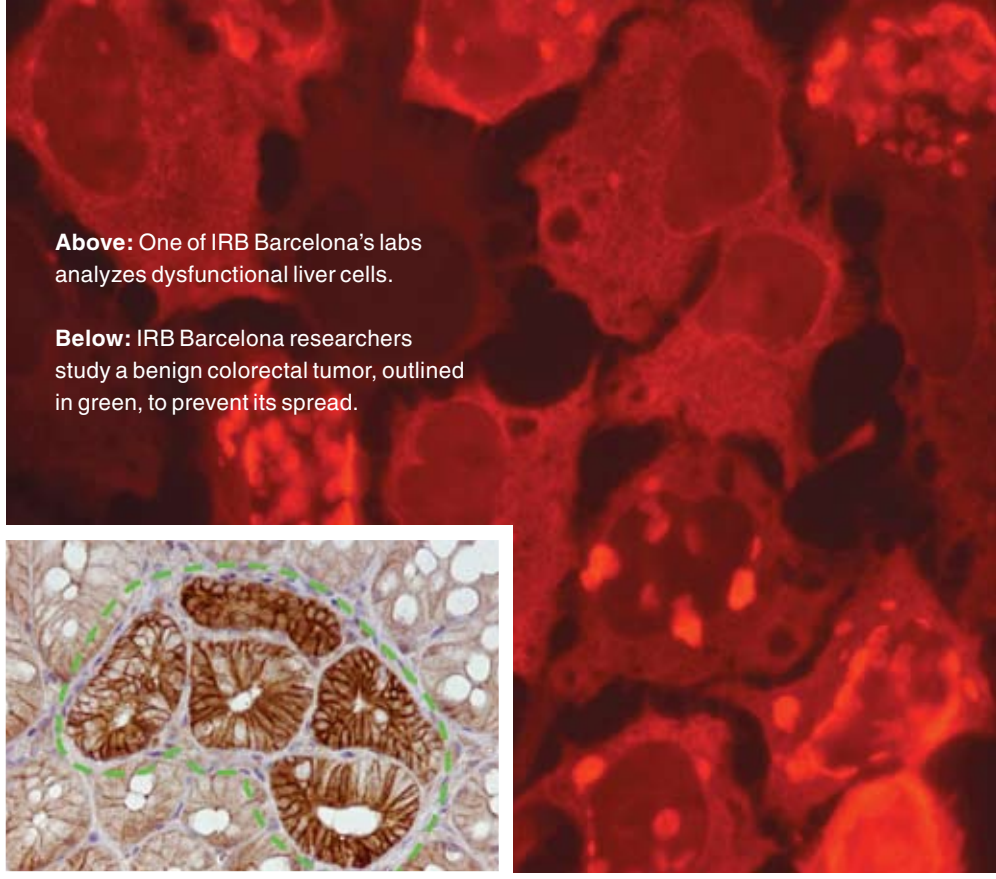
"Most of the drugs that have been a success in cancer treatment have come from a natural source, but a terrestrial source," says Carmen Cuevas, director of research and development for PharmaMar. "Why not use the sea as a source, if life started in the sea?"

This idea is exactly what spurred the creation of PharmaMar, one of Spain's oldest biotechnology companies, in 1986. Founder José María Fernández-Sousa, then a university professor involved in research and development at a local company focusing on microbiology and antibiotics, met a University of Illinois chemist who was examining marine products. Fernández-Sousa thought the sea could be a potentially perfect source of novel compounds, particularly those with antitumor properties.

Today, PharmaMar researchers organize six or seven expeditions a year at sites around the world, partnering with local research institutions in the host countries. Divers return to the surface with thousands of small samples of representative local marine life, though they're careful to avoid all endangered species; they have a strong company commitment to preserving the ocean environment. The result of these efforts is a library of frozen marine life under the building. With more than 42,000 samples, it is the largest such private library in the world.

Chunks of samples wait in smaller freezers in the labs at PharmaMar, filling the air with the tang of the sea. A scientist pulls out one dark-brown frozen lump and scans it into the computer: it's a sponge, and the photograph that appears on screen displays a significantly more attractive sight, with pale waving fronds fanning out. All samples are classified not only by species but also by the exact GPS location of the discovery site, with a visual description of the location and photographs of the species. This can assist

PHOTOS COURTESY OF PHARMAMAR



**Above:** One of IRB Barcelona's labs analyzes dysfunctional liver cells.

**Below:** IRB Barcelona researchers study a benign colorectal tumor, outlined in green, to prevent its spread.

divers should they need to return to the site to collect further samples.

After the samples are scanned, small shavings are tested for antitumor properties. But the invertebrates aren't the only species tested; all the bacteria and fungi colonizing the creatures are cultured and tested as well. Scientists evaluate the potential of tens of thousands of samples each year. When one shows promise in combating tumor growth or killing tumor cells outright, the molecule responsible is isolated and patented, and then chemists develop synthetic versions of it. Those new compounds then begin the same drug-testing path as all other potential cancer drugs.

Today, the company has 250 employees working on all aspects of drug discovery, identification, synthesis, and testing. One compound, Yondelis, which is derived from a tunicate named *Ecteinascidia turbinata*, is close to receiving approval for treatment of soft-tissue sarcomas. Yondelis is also being studied for the treatment of ovarian, breast, and prostate cancer. Four other compounds are in earlier testing phases. And according to Cuevas, a handful more are promising, though she says it's too early to be specific.

"If we pass the European authorities and begin marketing the drug, this will be an important moment," says Cuevas. "It's important for the company, because it will be the first pharmacological drug that PharmaMar puts out on the market. It's important for the marine-science community, because it will be the first marine cancer drug on the market. And in general, it will show that this isn't a crazy idea, as people thought when Dr. Fernández-Sousa started. It will demonstrate that the sea can be an important source for new drugs."

## Growing New Companies

Though Spain has a number of homegrown pharmaceutical companies, as well as a few companies formed in past decades that focus on biotechnology, the most significant increase in companies formed has taken place in only the last five years.

One of the most prominent examples of this new growth is Genetrix, formed by Cristina Garmendia (who also heads the Spanish biotech trade association ASEBIO). Genetrix spun off from the CNB in 2001, when Garmendia realized that while Spain produces a significant amount of quality research, there were limited paths to commercialization. She came to an agreement with the Spanish Research Council to buy a number of patents. The company began acquiring patents and building a base of widely varied services and research. Today, Genetrix has given rise to seven other spinoff companies.

"When I first joined, a year ago, we had 50 or 60 employees," says Claudia Jimenez, who is in charge of the company's corporate development. "We're already up to 100. And every month there are two or three new faces in the office."

In new labs being constructed for the spinoff Cellerix, the most advanced company in the Genetrix family, researchers walk around covered from head to toe in white, with white caps covering all exposed hair. They're preparing a new lab to work with adult stem cells. This is the only company in Spain with the authority to produce stem cells suitable for use in medicine.

Cellerix has two different lines of research. One, in clinical trials, uses stem cells from fat tissue commonly found in the abdominal region to treat complex perianal fistulas. There is currently no truly effective treatment for these fistulas, which occur when an opening forms between two passages in the body in the course of a variety of diseases, particularly Crohn's disease. "The only treatment today is surgery, and in most cases the fistula reappears after surgery," says Gabriel Marquez, vice president of research at Genetrix. "Plus, the surgeon almost always has to cut the sphincter muscles, so there's practically a 100 percent guarantee that the patient will suffer from incontinence."

In the treatment that Cellerix is studying, adult stem cells are isolated from the patient through liposuction, cultivated, and then implanted in the patient. In trials, this therapy has healed the ruptures. This is one of the most advanced studies using adult stem cells from easily obtained lipids (as opposed to bone marrow, for example) for therapeutic purposes.

A second line of Cellerix's research, also in clinical trials, is devoted to the rare skin disease epidermolysis bullosa, in which patients lack a critical protein.

PHOTOS COURTESY OF IRB

Even slight contact can cause the patient to literally lose skin. The skin substitutes in use today are not transplants and must be periodically replaced. Cellerix is developing a transplant consisting of a mixture that includes cells from the patient's epidermis and cells from healthy, compatible donors. The company has already achieved clinical proof of concept.

Working with adult stem cells is so new that the Spanish government has had to develop new regulations for this type of research. Even among European regulators, such research raises questions. "We are one of the few companies in Europe working with adult stem cells," says Marquez, "so the EMEA, which is the European FDA, calls us to give our views on the research. The whole field is so new that even the regulators have to figure out how to regulate."

Another Genetrix company, Imbiosis, has developed a novel method for detecting gluten. This is important to food processors in marketing to patients with celiac disease, which makes them sensitive to gluten. The company Sensia is creating a small, easy-to-handle biosensor to detect tiny amounts of a given compound in the environment.

With a handful of years of experience in starting biotechnology companies, Genetrix is also becoming a service company, starting to offer professional assistance to outside startups in, for instance, patenting, business development, and human resources. And the company has created something of a buzz in the biotech world. "Now, people come to us from the academic world to tell us about their data," says Marquez. "They want to know if we're interested in licenses or patents, or helping them go ahead with preclinical testing. We've managed in recent years to create real credibility."

## Developing Experience

Credibility is crucial in this emerging field. The company Advancell began when its university-based founders realized that their services in cell-based reagents were in high demand. Today the company has two main areas of operation: one in services and the other in innovative pharmaceutical products.

The pharmaceutical arm of the company is developing a new system for drug delivery based on nanoparticles and natural biopolymers. Basically, a naturally occurring substance called chitosan, a powder made of crushed crustaceans, provides the transport mechanism to encapsulate drugs in nanoparticles. This can be useful for topical delivery of drugs used to treat eye diseases, or for oral delivery of drugs such as insulin. Because this new technique is being tested with drugs that have already been approved, the trial phase is only about two years, as opposed to the usual 10 for testing new drugs—and these existing drugs could see dramatic improvement in efficacy and safety.

Advancell's business model is typical of many current Spanish biotech companies: they began providing services as a way to earn money and then invested that money in research and innovation.

The business model isn't the only typical feature of the Advancell story. CEO Luis Ruiz says his personal story reflects the experience of most others in the current generation of biotechnology entrepreneurs in Spain. He was a molecular biologist with years of experience in academia, then shifted to the local pharmaceutical industry and spent four years in business development.

"I had the rare hybrid academic and business profile that is required for managing these kinds of companies," says Ruiz.

Of other heads of companies that started within the past five years, such as Garmendia of Genetrix and Carlos Buesa of Oryzon Genomics, Ruiz says, "All of us came from the university, at a certain point shifted to industry, and with this experience began managing biotech companies."

Today the company has 30 employees. The services arm is already making money, and the research arm is closing in on creating a marketable product. "Now there are more people with a variety of experience," says Ruiz, but in 2000 or 2001, when the current generation of biotech business began, "not many people were willing to take the risk." Today, though, the field has changed. He adds, "I feel a little privileged; I'm a player in something that is evolving very positively, and I'm optimistic about where it's moving."

## Challenges

As players in an emerging biotech market, Spanish companies still have some challenges ahead. The first and most significant one, many observers say, is access to financial resources. Spanish investors are only now beginning to understand the potential of biotechnology and make a long-term commitment. And those same Spanish investors are crucial in getting companies to a place where they will be attractive to international investors.

That's the position Cellerix, the Genetrix spinoff, has already reached. Genetrix is working on finding partners in Europe, Japan, and the United States. "When you turn to outside venture capitalists, they always want to have a Spanish local investor who takes the lead, and that's been difficult in the past," says Claudia Jimenez.

The small (though growing) amount of funds available for new companies means that many are underfunded, according to Alec Mian, the CEO of Genmedica in Barcelona.

Mian, a Canadian who ran a biotech company in Cambridge, MA, for eight

**"I feel a little privileged; I'm a player in something that is evolving very positively, and I'm optimistic about where it's moving."**

years, had been living in Barcelona and was considering moving to London to head another biotech company when he was contacted by Antonio Zorzano at the IRB to head a company based on Zorzano's research into an oral replacement for insulin.

This was a high-risk project, but "if successful, such a discovery and development would put Barcelona on the international biotechnology map," says Mian. "So even though the risk of the compound was high … I decided to stay and give it a shot."

Another bottleneck is "how you manage the knowledge, more than in the creation of the knowledge," according to Luis Ruiz of Advancell. "We've already learned a lot, and we all have more experience now."

Joan Guinovart, director of IRB Barcelona, takes the management issue one step further. "We don't yet have any biotech millionaires," he says. "I think that would be a good incentive" to young scientists and business entrepreneurs starting out in biotechnology.

### Taking on the Challenges

Despite the challenges in accessing investment, funding opportunities for biotechnology companies have increased dramatically in recent years as venture capitalists in Spain have learned more about the sector, and as companies start to mature and attract investment from outside the country. Many companies describe recent large-scale investments from Europe.

Genetrix is initiating the first venture capital fund specializing in biomedicine, named Vanguardia BioFund 1. It expects to fund startups and expanding companies, with about 70 percent of the investments to flow to Spanish companies.

In terms of management, the latest crop of CEOs now have years of experience and are beginning to bring their know-how to a new generation of startups. In addition, the infrastructure to support technology transfer is growing ever stronger thanks to government, academic, and industry commitment, both on a national and a regional level.

The change in the last five years illustrates this growth. Guinovart is one example. Ten years ago he patented a potential antiobesity drug—and licensed it to Bayer. The drug is now in phase II clinical trials. "Now it's the other way around," he says. "You try to exploit the patent yourself."

PRBB in Barcelona is tackling many issues in business skills development with a devotion nearly equal to its focus on world-class scientific research. "We're focusing on developing companies in the future, but first, the most important [thing] is to have the best science," says project director Reimund Fickert. To develop the knowledge base in the region about issues related to patents, finances, management, and similar issues, the research park has developed a series of executive courses geared to biotech executives and managers, venture capitalists, business students, and others. The courses attract lecturers from the top ranks of biotechnology around the world; for three days at a time, the programs provide a combination of serious education and equally serious networking.

The Spanish government has demonstrated its commitment to technology transfer through Ingenio 2010, a program that includes more than $1 billion in grant money for research and for efforts to encourage collaboration between the public and private sectors.

Spanish pharmaceutical companies are joining together to advance the industry. Zeltia, Rovi, Faes Farma, Lipotec, and Dendrico have formed an alliance and a common investigation project called Consorcio Nanofarma, a multidisciplinary research project on nanomedicine and drug delivery systems.

The rapid growth of the industry, coupled with the investment in world-class research centers, has increasingly called Spanish researchers home from around the world to contribute to the country's, and the world's, focus on the next wave of biotechnology.

## Resources

**ICEX** (Spanish Institute for Foreign Trade)
www.us.spainbusiness.com

**ASEBIO** (Spanish Association of Biotechnological Companies)
www.asebio.es

**Barcelona Biomedical Research Park** (PRBB)
www.prbb.org

**BioBask** (Basque Plan for the Development of Biosciences)
www.biobask.org

**Genetrix**
www.genetrix.es

**Genoma España** (Foundation for the Advancement in the Research of Genomics and Proteomics)
www.gen-es.org

**National Biotechnology Center** (CNB)
www.cnb.uam.es

**PharmaMar**
www.pharmamar.com

**To find out more about new technologies in Spain, visit:**
www.technologyreview.com/spain/biotech

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