



Spanish science has a lot of catching up to do before it joins Spanish football at the top of Europe.

Life science in Spain

# Strangers At Home

Spanish politicians have recently promised new institutes, more positions and higher investment in science. More than soothing words? José L. Neira and Rodrigo J. Carbajo think that, first of all, some special features and characteristics of the Spanish science system will have to change before researchers can really hope for a better future.

**P**essimism is not a politically correct word these days in Spain. While the economy of the country appears to be in a state of free fall, dropping faster than that of our European neighbours, positive words seem to be the main recipe from our socialist leaders for combatting the imminent recession. “Pessimism doesn’t create jobs,” as the Spanish Prime Minister recently put it. Optimism doesn’t necessarily either, many of us would argue. Words are useful for politicians; however, words don’t change reality as actions and facts do.

Trying, as political leaders, to show that they know the right path and in an effort to raise Spanish public spirits, officials have said that those Spanish regions (so-called communities) that have based their wealth not only in bricks but also in knowledge, are less affected by the current crisis (evolving in neighbouring EU countries)<sup>1</sup>. According to that syllogism, a radical change to the current economic system would be necessary, recreating that successful model but removing the brick-based economy, which has prevailed for almost fifteen years. We completely agree that the model ought to be urgently changed but exactly what actions are appropriate must first be carefully discussed and planned.

According to our politicians, knowledge is based on science; optimistic state-

ments about which economic model to follow have inundated the heads of the recently created Ministry of Science and Innovation. “Budgets will be boosted,” they announce; “50,000 thousand scientists will be recruited,”<sup>2</sup> we hear, incredulously. And the list doesn’t stop there: new research institutes will be built, investment in science and innovation will be the future of the Spanish economy, etc. However, when the same vague promises have been heard over many years, the only change being the person behind the voice, then a degree of scepticism is to be expected or, indeed, recommended. We Spanish scientists, start feeling like strangers in our own land, where political leaders think that a few soothing words can smooth over everything.

## Facing a long struggle

After all, Spanish investment in science is still at 1.2% of GDP, well below the 3% goal set by the EU for 2010 (according to the Lisbon agenda), and far from the EU average: 1.84%<sup>3</sup>. Spain occupies 23<sup>rd</sup> position in the global *IT Industry Competitiveness Index 2008*, with very poor levels in technological infrastructures (31.2 out of 100) and an unfavourable environment for R&D (3.9 out of 100)<sup>4</sup>. There are 189,000 people employed in “innovation and development” (I&D) (or “research and de-

velopment”) activities but of these, there are 116,000 researchers in the whole country<sup>5</sup>. In 2006, €11,815 million was invested in I&D, which, our leaders claim, implies a growth of 15% – well above the 5% average increase of other EU countries. It is true, the investment in I&D has grown healthily in recent years (with the help of FEDER European funds) but we scientists were last in the line and face a long struggle before reaching even middle positions.

## Empty university classes

Creating 50,000 new positions is a gigantic task, particularly in times of crisis, and when most of the I&D Spanish system relies on civil service positions (functionaries). Furthermore, those 50,000 should not be seen as Spartans come to repair the damaged Spanish economy but rather as a long-term enforcement to acquire more knowledge and improve Spanish competitiveness in Europe. What could we do to increase that force? We have several alternatives available; however, many of them might not work properly due to the features and characteristics of the Spanish science system.

The first objective would be to start re-seeding the ground and pave the way for fresh impetus. For more than twenty years, different Spanish governments

have tweaked the education system, especially the pure, basic science curricula. The different reforms have accumulated with such velocity that it is impossible to say if something has worked well or just served to worsen the education problem. We certainly believe that the situation in basic sciences (vital to I&D progress, as perceived by our leaders) is far worse than 15 years ago. Today, Spanish university classes in basic sciences are so empty that you could just as easily take the handful of students to the nearest pub and show them the Maxwell equations over a beer. Furthermore, in the popular applied science studies, such as Industrial Engineering, the students' lack of academic preparation can be extremely frustrating.

"Four years ago, I was explaining the first-order kinetic law to the Chemistry students in the first year of Industrial Engineering", says Dr. Javier Gómez in University Miguel Hernández in Spain, "When I was finished with the calculations, one of the students raised his hand and said, "I understand everything except for that large, S-like symbol at the beginning of the rate. What does it mean?" Javier concluded in despair, "The S-like figure was the integral symbol for deducing the complete equation. You know, the guy hadn't understood a word, but worst of all, a high percentage of students in the first course of an engineering career don't even know what an integral means". The situation, however, seems to be similar in other European countries<sup>6</sup>. The solution, we think, is that the liberty to decide on educational reforms (even at the European level) should be removed from politicians. In our view, education at all levels must be evaluated and judged properly over long-term periods and by independent bodies.

### Second class recruitment

So, if the original harvest is not ensured (due to our own pitfalls), where will those urgently needed 50,000 people in the Spanish I&D system come from? "Well, hire scientists from abroad", they say in the Ministry. "Hire the best possible scientists in the world". Spain has many things to offer newcomer scientists but not necessarily those interested in competitive science. Therefore, this could result in recruitment of people more interested in the secondary aspects of the job rather than science itself.

The additional problem when trying to hire the best scientists is being able to provide them with the best infrastructures in

the world. Spain definitely lacks those infrastructures at the moment. To hire top scientists, one must be able to pay them accordingly; however, the public system of Spanish research work predominantly relies on civil servants, whose salaries are not very high. An exception is the Spanish National Research Center (CNIO), which has pioneered an alternative to the overwhelming majority of research institutes in Spain, by recruiting its own people to a sort of tenure track position. Similarly, in the CICBiogune (Basque Country) and Barcelona Biomedical Research Park, recruitment is at the sole discretion of the Park<sup>7</sup>.

### An exemplary experience

However, the more common cases of top scientists endeavouring to pursue a career in Spain are embodied in Dr. Douglas V. Laurents' experience, an American researcher, who is currently at the Institute of Physical Chemistry Rocasolano in Madrid, belonging to the Spanish Research Council (CSIC). He describes his own march through the maze of Spanish bureaucracy in research, "In July of 1997, I came to Spain as a postdoctoral worker at one of the top institutes of the CSIC, to a laboratory with a high international reputation, with a three year fellowship from the Leukaemia Society of America. In the fall of 2000, after having decided to stay in Spain and finding no open tenure track positions in research, I considered myself lucky to get a teaching job at a small private university in a nearby province. In the fall of 2001, I switched to teaching at a branch of an American University in Madrid (Saint Louis University) and I returned to the States in the summers of 2001 and 2002 to do some research with a former advisor. At the start of 2003, I was able to return to research in Spain thanks to a fellowship from the Ramon y Cajal programme, which is considered to be a "tenure track" position. After a successful "opposition" exam in 2005, I became a tenured staff scientist in July of 2006". This way, Laurents finally became a member of the research system in Spain.

Of course, becoming a civil servant has its own perils, as Laurents tells us when comparing the Spanish to the American system, "One big difficulty I faced as a foreigner in the Spanish academic system was having to *homologar* my degrees". *Homologar* means that your degrees must be "translatable" to degrees available and offered by any University in Spain.

Laurents continues with his list of never-ending hurdles, "This process is more dif-

difficult for a non-European like me. It is also a long process (more than a year) and involves obtaining a number of official documents (class-work and grades) from previous universities, 'Seals of the Hague' (another document that certifies that the official documents are actually official). Finally, expensive official translations of these documents are also required." The only advantage for Laurents was the "strong support from my department and institute during those years".

### Bureaucratic pitfalls

As many other foreign workers do, Laurents has also considered approaching a private company. In contrast to other European countries, however, the fraction of people employed in research activities is almost insignificant in Spanish companies. Laurents reports, "I did look for jobs in private industry. In 2000, I sent over 100 letters to all the companies I could find in Spain doing pharmacy, chemical companies. I only received several letters of rejection. Finally, I had two job interviews, both through personal contacts. But neither of them made me an offer."

Laurents compares the system in his own country with that of Spain, "The difficulties, in my opinion, are greater in Spain than they are for foreigners in the USA. Another advantage of the US system is that it is relatively easy for successful scientists to move from less to more prestigious universities or research centres. An increased mobility for Spanish researchers would be very positive for Spanish science, in my opinion."

Once you become a civil servant in one institution, either belonging to CSIC or to a University, it's almost impossible to change to another institution. To move to another university in a different "community", for example, you'd have to pass the opposition exam again; to move to another centre belonging to CSIC you must be approved by the rest of the researchers working in the new institute. Thus, in Spain you are chained to the institute or university where you passed the "opposition" for the rest of your scientific life.

So, if the yield is poor and the foreign fruits are subject to massive bureaucratic controls before the system deems them "edible", what do we finally have? What's left is a yield cultivated with the help of the FED-

ER funds from the European Union, invested either in people or in scientific equipment. The highly-acclaimed Ramon y Cajal was set up in Spain when the Popular Party was in government at the beginning of the decade, with the aim of re-integrating a young generation of Spanish scientists from abroad<sup>8,9</sup>. Many such scientists could have benefited directly from the investment in science and technology with the money sent from Brussels. However, the election system in the Ramón y Cajal programme is heavily skewed, as is the "opposition" system to become a civil servant. Corruption rules those appointment systems<sup>10,11</sup>. Attempts by successive governments to reduce the academic endogamy have failed, as most institu-



**El toro español**  
– also a symbol for the  
stubbornness of Spanish science institutions?

tions do not advertise positions until an in-house candidate has been found to satisfy the requirements. The proposed national evaluation of candidates based exclusively on a detailed CV (as in the Ramón y Cajal evaluation) has also failed and proved useless against internal hiring, since universities and research centres retain control over the final selection process.

### Little freedom to develop their own ideas

To top it all, those successful Ramón y Cajal candidates who finally enter the system through corrupt practises or on their own merits must, in many cases, face the fact that they may not proceed with their own research and pursue their own ideas, but are hired almost as high-tech postdoctoral workers in their own country. They are strangers in their own backyard, where they have no freedom to develop their ideas. "I was lucky," comments Laurents. "In my group I was able to develop my own ideas and pursue my own interests with com-

plete independence. I know, however, that this is not the case for many Ramón y Cajal fellows." The consequence being that some fellows finally resign due to all these difficulties and the brain drain continues. Hence, a policy increasing internationalisation and decreasing the endogamy in the Spanish research system should be strictly applied without delay.

### Resigning fellows

The optimistic enthusiasm surrounding the new Spanish Ministry has crystallised in public declarations such as those described above – not only in Spanish newspapers but also in scientific journals<sup>12</sup>. Its head, Dr. Cristina Gramendia, recently said that the Ministry wants to keep the "blue-sky research" practised by the universities in the newly planned Law of Science, which is soon to be introduced to I&D centres and research institutes around the country.

However, we believe that a series of ragged cumulonimbus clouds is approaching Spanish science from different sides, indicating a cold front. Spanish newspapers quoted close advisors to Dr. Garmendia, who recently declared that in Spanish science there are enough papers but too few patents<sup>13</sup>. Although that statement is partially true, the scarce science investment during recent years cannot hope to improve the

yield within such a short time, given the extensive stunting of Spanish science over recent decades. Other, more advanced countries, also started by publishing discoveries in basic fundamental science before reaping the fruits of these patents several decades later. Thus, initially, the Ministry appears likely to support only those projects guaranteeing short-term knowledge production and with highly profitable results. One wonders what would have happened to modern society had the Royal Society acted along the same lines when it came to that guy in the basement working with machines that decompose useless materials, the now renowned Michael Faraday.

For example, in the last round of Spanish National grant applications, in order to apply for funding for a technician it was mandatory to have the support of a small and medium company (SME); it was also highly desirable to gain the support of a SME before applying for PhD fellowships. "The situation is so completely out of con-

trol”, reports Dr. Mauricio G. Mateu, lecturer in Universidad Autónoma de Madrid. Young entrepreneurs with vague ideas call university lecturers they have randomly selected from the university’s directory with requests such as, “Listen, I’d like to apply for the next Ministry grant to help create a biotechnological company. Have you got any ideas I could use?” These days, some researchers devoted to good basic science may be tempted to consider such bizarre propositions, as this could provide their group with much better government-sponsored funding.” Science is not based on such impositions but is rather a catalyst for rational free thinking and hard work, where no money is involved on a fundamental, corrective basis.

Moreover, the Ministry does not seem to acknowledge that, in the absence of European funds, Spanish universities and the Spanish Research Council (CSIC) have started in reverse order. The universities abruptly stopped hiring new Ramón y Cajal scientists and recruitment only happens when lecturers are required. In most cases, only well-connected scientists are awarded one of these rare contracts. The Spanish Research Council, which is still heavily anchored by the system Douglas Laurents described above, initially welcomed hundreds of Ramon y Cajal scientists but has since failed to increase the number of positions once the contracts have run out. Apparently, nobody is interested in keeping the tenure-track for another period of time.

### European money wasted

With the firing out of I&D people, a lot of expensive scientific equipment (acquired, incidentally, with European funds to help prevent the Spanish brain drain) has been left unattended. Consequently, research technicians are also being let go because the instruments are unused and they are no longer required. Consequently, the huge amounts of European money invested and the knowledge acquired are dwindling away.

In our opinion, the new Spanish Ministry should firstly try to maintain the achievements accomplished during more recent years. Furthermore, in times of an economic crisis, it should at least try to provide the most useful and productive research people with the minimum required to allow proper working conditions. Things are difficult everywhere and the task faced by the Ministry to recruit 50,000 new researchers will also prove extremely challenging. The solution, in our view, is to re-

tain only the most highly talented research personnel (i.e. no more “corruption) and to adopt more flexible contractual policies, not only for those working inside but also for those reputed scientists endeavouring to come from abroad. In this sense, perhaps the new European plans proposed by the Commissioner of Science and Research are tending in the right direction<sup>14</sup>, although they will surely clash with some of the national (or even local) science policies.

### Paths to follow

We believe that all the reforms should be carried out by fully independent bodies, not by politicians with short-term interests at heart. And whatever reform is decided upon in the next few years, it should follow the path trodden by other European countries (such as the MRC in the UK, or the Max Planck Society in Germany), whose scientific models (after many years of testing and correction) have proved to be successful.

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