



Career strategies for young European scientists (XVIII)

Ponte Vasco da Gama, Europe's longest bridge, spans the Tejo river in Lisbon.

Bem-vindo a Portugal!

Portugal is becoming an increasingly popular destination for tourists from all over the world. Explorers including Vasco da Gama and Bartholomew Dias stand for 800 years of Portuguese history and culture. Many of us are carried away by enthusiasm whenever Portuguese soccer players such as Figo and Ronaldo slot one home. After a long day on the beach you can enjoy a sip of Portuguese wine. But did you ever hear of Portugal as a magnet for ambitious young foreign scientists? Here, *Lab Times* introduces a couple of primary research institutions and you will soon notice that Portugal has some hidden jewels deserving your closer attention.

Inventory

With about ten and a half million citizens Portugal is one of the smaller European countries. Its economy is struggling, ranking only 19th among the 27 EU member states on the basis of the per capita gross domestic product. The unemployment rate has hit new heights. To counter these developments, sweeping reforms have been initiated by the Portuguese government under Prime Minister José Sócrates. One of his approaches is to bring about a change from the current labor-intensive industry to a more export-oriented market with more advanced technologies and products. This re-

quires substantial investment into research and innovation, as outlined, for example, in several recent policy documents such as the Technology Plan (2006) and the National Strategic Reference Framework (2007-2013). A clean proof of its commitment is the rise of relative expenditure on research and development. At 1.1 % it reached its all-time high this year and was comparable to that of Spain or Italy. To attract the best scientists, a call to hire 1,000 postdocs for up to five years irrespective of nationality was launched by the Ciencia 2007 initiative. For more experienced scientists, a call for 50 invited chairs was published in 2008.

Research and development in Portugal is hallmarked by rapid progress at a low overall level. The annual growth rate of its research output is three times higher than the world average. The number of publications has doubled to quintupled in many areas of the biological sciences and medicine over the last decade. More than half of its publications result from collaborations with international partners, mainly from the USA or UK. In 2007, the number of doctoral degrees in the areas of life and health sciences reached almost 300, a substantial increase from 70 doctorates in 1990.

Due to its own limited resources and infrastructure Portugal needs a helping hand from outside. It has made agreements with

several European research organizations, aiming at full membership in future. These include the European Space Agency, the European Laboratory for Particle Physics and the European Southern Observatory. Moreover, Portugal has several agreements for graduate education as well as research with leading international institutions: for example with the Massachusetts Institute of Technology; the Carnegie Mellon University in Pittsburgh; the University of Texas at Austin; Harvard University and the German Fraunhofer Society. Since 1986 Portugal has also been a member of the European Union. A large share of its public research funding comes from structural or social EU funds, which have been guaranteed until 2013.

Higher Education

The Portuguese higher education system has two main subsystems: universities and polytechnical universities. For a long time, universities have been focused on research, whereas the polytechnical universities have been more profession-oriented. However, as a consequence of the Bologna process and other reforms, the polytechnical universities have assimilated many features of the universities. One of the world's oldest universities is the University of Coimbra, which was founded in 1290. Polytechnical

universities were first established in the 1980s with some roots dating back to the 19th century. Currently there are 14 public universities and about the same number of public polytechnical universities. In addition, there are about 35 private universities, plus a similar number of private polytechnics. However, the majority of research activity and public funding is concentrated on a few public universities. For students there are many opportunities to switch between private and public institutions.

Since 2006, universities as well as polytechnical universities have been able to award a first degree (*licenciatura*) and a second degree (*mestrado*), whereas only universities award doctoral degrees (*doutoramentos*). To become a professor (*agregação*) specific examinations have to be passed and excellence in research and teaching has to be proved. It is noteworthy that no European country employs a higher percentage of women as full professors than Portugal. Access to higher education institutions is restricted by numerus clausus. Although there are some excellent research and educational institutions, the



You surely won't escape Portugal's football madness.

overall situation for students is still not very satisfying. High tuition fees, old curricula and other adversities cause about 40 % of all students to drop out before getting a degree. After graduation, a fifth of all graduates abandon Portugal and pursue their career somewhere else.

According to several worldwide rankings Portuguese universities are not among the top institutions. For example, in the THES World University 2008 ranking, the University of Coimbra made it to number 387; the University Nova of Lisbon was further behind. Better rankings are observed if subcategories are rated. For example, Coimbra University was ranked 138th, 243rd and 271st, in Arts & Humanities, Technology and Life Sciences, respectively.

Foundation for Science and Technology

The Foundation for Science and Technology (Fundação para a Ciência e a Tecnologia, FCT) provides a large share of public funding for Portuguese science. It is an organization within the Ministry of Science, Technology and Higher Education (MCTES) and was established in 1997. The FCT awards annually about 2,000 PhD and 1,000 post-doctoral fellowships. They are usually announced on the FCT homepage as well as on the mobility portal Portugal (www.eracareers.pt). It uses two major routes of public financing: institutional support and project-based funding, which account for almost 50 % and 25 % of the national science and technology budget, respectively.

Institutional funding allocates money directly to the institution. Multi-annual support is provided and is subjected to international review. In 2009 institutional funding is estimated to be in the range of €880 million. Four types of organizations benefit: (1) the higher education sector, including universities, polytechnical universities and institutions associated with or close to universities, (2) the nine state laboratories, including the National Institute of Biological Resources, the Dr. Ricardo Jorge National Health Institute and the Institute for Tropical Scientific Research, (3) about 25 associate laboratories, and (4) more than 400 research units. State Laboratories are state-managed autonomous research institutions. Associate Laboratories receive their status by MCTES after their scientific output as well as their cooperative capacity have been rated as excellent. They are often established by bringing together outstanding labs from different departments or institutions as well as companies. Smaller research units are usually associated with universities and carry out research activities in their respective scientific fields.

Project-based funding concerns the funding of projects by FCT on a competitive basis. These projects are carried out by the same organizations that receive block funding. A second mode of project-based funding encompasses projects in the frame of the National Strategic Reference Framework Program 2007-2013 and involves companies or consortia between universities, state or associate laboratories and other non-profit organizations and enterprises. Project-based funding is projected to reach €460 million in 2009.

Other modes of funding by FCT include the Academic Community Support Program (FACC), which provides selective funding to initiatives which are not supported by one

of the FCT's specific programmes. For example, the organization of scientific meetings in Portugal and publication costs are funded, as is participation in foreign conferences by doctoral or postdoctoral researchers and short-term research visits by scientists from abroad. So it should be feasible for you to obtain finance for a shorter or longer research stay at a Portuguese institution even if you do not bring your own money.

Biomedical Research at its Best

By funding volume and research output, a handful of Portuguese institutions doing biomedical research stick out: the Instituto de Medicina Molecular (IMM) in Lisbon; the Institute of Molecular and Cell Biology (IBMC) in Porto; the Institute of Molecular Pathology and Immunology of the University of Porto (IPATIMUP); the Centre for Neuroscience and Cell Biology (CNC) in Coimbra and last but not least the Instituto Gulbenkian de Ciência (IGC) in Oeiras. All of these institutions are, or at least

claim to be, multidisciplinary, provide excellent and state-of-the-art core facilities to their members, have dedicated PhD programs and international advisory boards, and promote early independence as well as internationalisation by hiring group leaders from abroad and by intense international collaboration.

For example, the Instituto de Medicina Molecular (IMM) in Lisbon was established in 2001 and moved into the new Egas Moniz research building in 2004. The IMM is part of the Medical School of the University of Lisbon and focuses on three major areas: immunology and infectious diseases, neurosciences and cell and developmental biology. There are close to 30 research groups with more than 300 researchers including students, and two new group leaders are hired each year.

The Institute of Molecular and Cell Biology (IBMC) was founded in the 1990s at the University of Porto. Major research areas are genetic and infectious diseases, immunology, neuroscience and structural bio-



Perhaps the best-known living Portuguese life scientist: neurologist Antonio Damasio (working in California).

logy. The IBMC houses about 30 research groups and 200 graduate students and promotes basic research projects that may advance into biomedical or clinical applications. Joint programmes are in place with a couple of private foundations or companies such as BIAL, one of the largest pharmaceu-

Interview

“Lunch Is A Big Deal Here”



Lars Jansen is a group leader at the Instituto Gulbenkian de Ciência (IGC). He was born in the Netherlands and got his PhD from the University of Leiden. After doing a postdoc with Kevin Sullivan and Don Cleveland at La Jolla (US) he started his first group at the IGC in April 2008. He works on the epigenetic regulation of mitosis. In 2009 he received an EMBO Installation grant that is funded jointly by the Gulbenkian Foundation and the Portuguese government.

What drew your attention to the IGC?

Jansen: I have heard about the IGC even before doing a PhD. After my postdoc I was not quite ready to simply go home. I was invited to the IGC along with several other candidates for a symposium in presence of the scientific advisory board. I was struck by the vital and vibrant atmosphere of the institute, its professionalism and seriousness about science. The offer I negotiated at the IGC was similar to the ones I got from Holland. In the end my gut feeling decided to try something different.

Why did you start at the IGC?

Jansen: The IGC offers several unique advantages for starting groups. PIs are expected to develop their careers in full independence. They acquire independent funding and publish without any department head. Another major advantage is that working in a privately funded organization means that you are not totally dependent on third party funding. In addition, the IGC has a very flat organizational structure, which makes decision-making fast and flexible, unlike most universities. Also, the fact that in Portugal there are only a few outstanding institutions trans-

lates in attracting the best students. In that respect it is better to be here and not at an average American university with the same scientific output.

How is your group currently funded?

Jansen: Apart from the EMBO installation grant I received support from the EU through a Marie Curie Reintegration grant. Both grants are great in that they can be spent quite flexibly. Initially I relied on startup funds from the IGC to get the lab going. The EMBO grant has a major impact because it also allows me to enter the EMBO Young Investigator programme connecting emerging group leaders across Europe. I have not been here long enough to compete for any regular national funding, revealing an important deficit in Portuguese science. There are only occasional national calls for applications with little money to spend, which makes it hard to plan for the future. This is unlike the US or my native Holland, where funding calls are regular and funding is multiannual.

And your career perspectives at the IGC?

Jansen: I am on a 5-year contract. The IGC currently serves as a springboard

tical companies in Portugal. In 2000, the IBMC, in partnership with the Institute for Biomedical Engineering (INEB), received the status of an associate laboratory in order to enhance existing competencies in the fields of biomedical engineering and molecular and cell biology. Together with the Institute of Molecular Pathology and Immunology of the University of Porto (IPATIMUP) the IBMC-INEB Associate Laboratory recently formed the Instituto de Investigação e Inovação em Saúde (I3S) to further strengthen interdisciplinary research.

Gulbenkian Foundation

There are quite a few private Portuguese foundations with a very broad spectrum of activities. Two major benefactors of biomedical research are the Gulbenkian Foundation and the Champalimaud Foundation. The Gulbenkian Foundation (Fundação Calouste Gulbenkian) was created in the middle fifties by the Armenian Calouste Sarkis Gulbenkian. Over the last fifty years the assets of the foundation have climbed to

more than €3 billion and its annual budget is close to €110 million. The headquarters of the foundation is in Lisbon with branches in London and Paris. The foundation is active in several areas, including science, the arts and charity. Their major effort in science is made by supplying the Instituto Gulbenkian de Ciência with about half of its annual research budget. Smaller programmes are in place and provide, for example, equipment for Armenian scientists or doctoral fellowships for graduates from Portuguese-speaking African countries to work on neglected tropical diseases. There are no further opportunities for scientists from abroad to apply directly at the foundation for fellowships, research grants or additional funding.

The Instituto Gulbenkian de Ciência (IGC) was founded in the 60s and is the Portuguese flagship of biomedical research. It is located in Oeiras, just 20 km west of Lisbon and devoted to biomedical education and research. According to Ana Godinho from the IGC, the institute currently has

for getting a more permanent job somewhere else. A few groups have acquired some continuity, but most are scheduled to leave. Although the IGC enables a quick start on ones career, the outlook for science in general is somewhat worrying. It is true that Portugal has made serious efforts to promote science. However, with the current national budget for research and unpredictable funding cycles it is not clear if and how it can sustain the current boost in scientific activity in the future.

Do you speak the Portuguese language?

Jansen: I have learned some Portuguese before coming here, so I get by fine in daily life. In addition, I have small children learning Portuguese now as mother tongue. My four-year old has already surpassed me and is teaching me. Speaking Portuguese is not essential at the institute, however I feel that speaking even a little bit opens many doors. It helps in building relationships and greases the wheels with non-scientific personnel.

Do you feel integrated into the scientific and social life here?

“Science is not different than anywhere else.”

Jansen: Science at the IGC is not different than anywhere else – so it is easy to integrate. Getting accustomed to social life takes more effort and requires you to be open-minded. Portuguese culture is one of warm-hearted people knowing how to enjoy life. Lunch is a big deal and ample time is reserved for this. The hardest thing to get accustomed to is the personal way of dealing with each other. In the US you would send an email and know that everything is taken care off. Here that email often requires a follow-up phone call or better, drop by in person, shake hands, have a chat first and then get down to business.

What do younger Portugese think about their scientific careers?

Jansen: They now have plenty of role models around who left Portugal for a PhD or postdoc, returned and are successful. Although many students still think that it is a good idea to start abroad, they start to realize that good science can also be done here.”

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about 380 researchers, including students, more than 10% from abroad. Since 1991 the IGC has been managed by the well-known immunologist António Coutinho. He engaged an illustrious scientific advisory board, including Sydney Brenner, Martin Raff, Susumu Tonegawa and Richard Axel. The IGC houses three independent graduate programmes: multidisciplinary life sciences, computational biology and neuro-

To be competitive with the first division of leading institutions, special offers are made to attract the best researchers to the Champalimaud Centre. For example, a security and mobility fund was established and provides extra cash for investigators at the end of their contracts. Thus, they arrive at their new institution with research money and do not come with empty pockets. In 2007, the neuroscience programme

Main research areas include nanomedicine, nanoelectronics, nanomachines and environment monitoring and food security. Of special interest to you are the topics of the nanomedicine division: drug delivery systems, molecular diagnosis systems, cell therapy and tissue engineering. With an annual budget of about €30 million it aims to become an international competitive research institution and to attract the best talent from all over the world. At the beginning of August there were many open job announcements for postdocs, junior researchers and principal investigators at junior level. A remuneration scheme in line with those offered by other international organizations was promised as well as substantial funds for equipment and personnel. The INL has already set up several agreements with leading institutions such as the Massachusetts Institute of Technology, the Center for Functional Materials at Brookhaven National Lab, the iNano-University of Aarhus and the National Institute for Material Science at Tsukuba. If you decide to get involved at the INL you may well become part of a transnational research team and establish useful contacts for your further career.



Portugal's 'research powerhouse': the Instituto Gulbenkian de Ciência (IGC) in Oeiras.

sciences. The programmes share a common initial teaching component, after which the student is free to decide on his future research and research team, either in Portugal or abroad. 17 out of 42 research groups are led by non-Portuguese scientists. On average three to six group leaders are recruited each year. After several changes over the last decades, the IGC nowadays operates as a temporary host institution for Portuguese as well as foreign research teams and individual scientists. It is definitely worth having a closer look at the "positions open" section from time to time.

Champalimaud Foundation

The second private foundation presented here in detail is the Champalimaud Foundation, which was established just five years ago. The late banker and industrialist António de Sommer Champalimaud donated half a billion euros, a fourth of his fortune, for biomedical research without giving any further details on how the money should be spent. The President of the foundation and former Portuguese health minister, Leonor Beleza, decided to concentrate on translational cancer research as well as basic neurobiology. A prominent scientific advisory committee, including the Nobel laureates James Watson and Susumu Tonegawa was formed. A research and clinical building called the Champalimaud Centre for the Unknown will open in October 2010. The Indian star architect, Charles Correa, was engaged to design a stunning research institute worth US\$ 120 million. It will house top-of-the range equipment used by at least 300 scientists.

was started to support researchers working on the neural basis of behavior. An international neuroscience PhD programme, a postdoctoral programme and workshops are the major educational elements of this organisation. The recruitment of head scientists is currently underway and about 10 group leaders have already been recruited from Cold Spring Harbor Laboratory, Columbia University, National Institutes of Health, HHMI Janelia Farm, Biocenter Basel and from local institutions. They have all set up temporary labs at the Gulbenkian Institute of Science. If you are interested in neurosciences or cancer research do not ignore the Champalimaud Centre for the Unknown in the years ahead.

Iberian Nanotechnology Lab

Finally, we come to the Iberian Nanotechnology Laboratory (INL), which opened this July. It is the first international institution in Europe in the field of nanosciences and nanotechnology. Although established by Portugal and Spain, it will be open to other countries in the future. The INL is located at Braga in the north of Portugal and has an international legal status similar to that of CERN or EMBL. The construction of the INL was facilitated by structural funds from the EU, which will also contribute to running costs in the up-coming years. It will house about 200 scientists and 100 PhD students and additional support staff.

Outlook

More and more Portuguese expatriates are returning home after the conditions for science were substantially improved. A couple of modern and interdisciplinary institutions have been established that make it possible to do competitive research at an international level. Obvious drawbacks are the poor economy, which may influence the budget for research and innovation in upcoming years, and the shortage of acceptable funding opportunities at the national level. Providing sufficient start-up funding as well as early access to Portuguese grant money for a larger crowd of non-Portuguese research talents should make Portugal even more attractive. If you are already able to tap international money sources the advantages may outweigh the disadvantages. What are you waiting for? Go and buy a Portuguese phrase book! RALF SCHRECK

Internet Resources

- ▶ Mobility Portal Portugal - www.eracareers.pt
- ▶ Foundation for Science and Technol. - <http://alfa.fct.mctes.pt>
- ▶ Ministry f. Science, Technol. & Higher Education - www.mctes.pt
- ▶ Instituto Gulbenkian de Ciência - www.igc.gulbenkian.pt
- ▶ Champalimaud Foundation - www.fchampalimaud.org
- ▶ Iberian Nanotechnology Lab - www.iinl.org