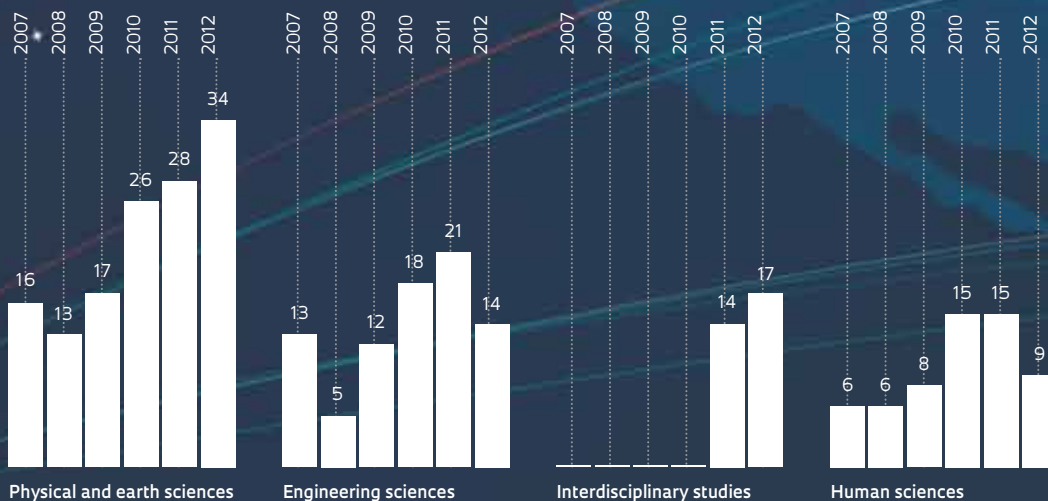


**PERCENTAGE OF POST-DOCTORAL GRANTS AWARDED BY FAPESP TO RESEARCHERS WHO HAD COMPLETED UNDERGRADUATE STUDIES ABROAD, BY YEAR**

Physical sciences record the strongest growth among the major fields



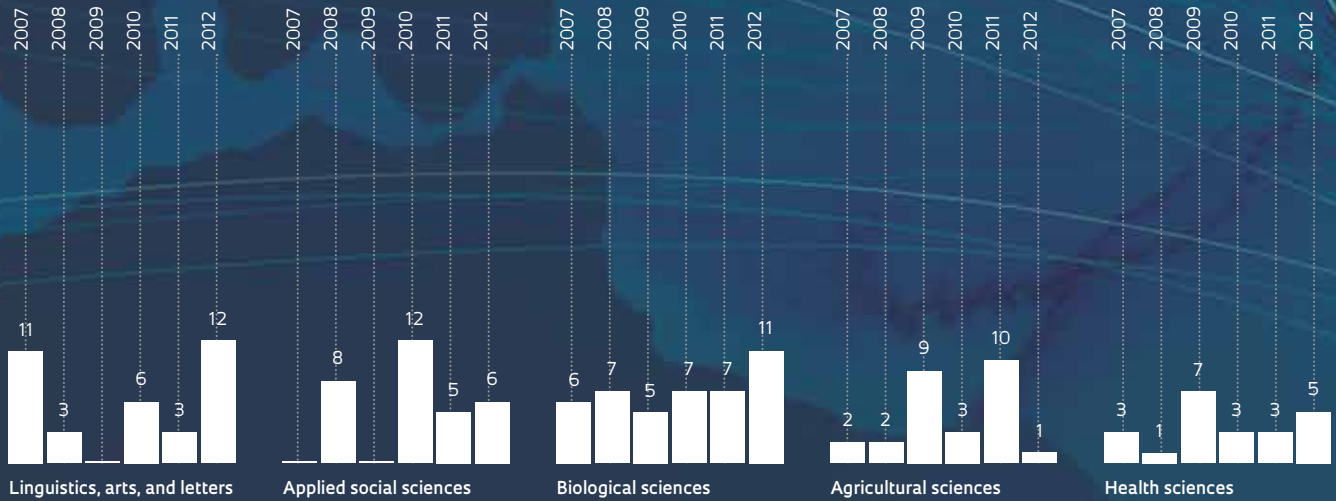
# Competitive Science

Internationalization of São Paulo research is enhanced by the arrival of FAPESP grantee post-doctoral researchers from abroad

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**R**ecent FAPESP data show that the flow of post-doctoral researchers from other countries to São Paulo State institutions is undergoing significant changes. The most significant example is observed in the field of physical and earth sciences; in 2007, 16% of the Foundation's post-doctoral grants were made to researchers who had earned their undergraduate degrees in other countries. Among new grants awarded in 2012, that figure has jumped to 34%. The change is also observed in other fields between 2007 and 2012, such as biological sciences, where the increase was from 6% to 11%, and applied social sciences, where grants rose from zero to 6%. The only area that experienced a reduction in the proportion of grants awarded annually to post-doctoral candidates who had performed their undergraduate work abroad was agricultural sciences, which declined from 2% in 2007 to 1% in 2012 (see graph).

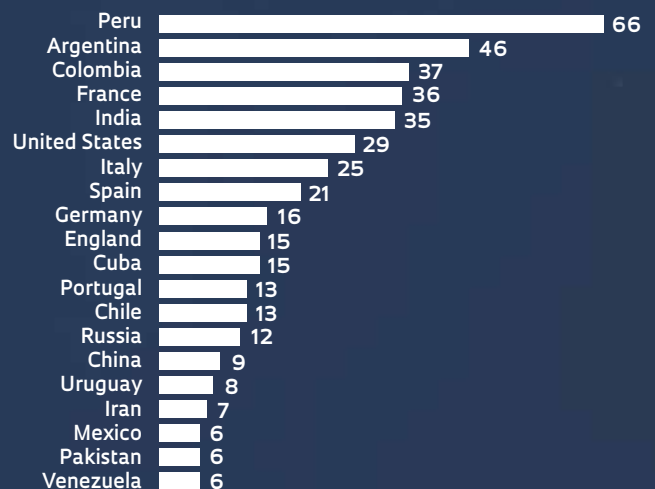


More and more brains are being lured to São Paulo because of factors such as international recognition of a growing number of Brazilian research groups engaged in competitive science and an increase in incentives to internalize Brazil's research efforts, a process in which FAPESP has played a major role by offering grants to researchers from other countries. Another influential factor is the economic crisis afflicting Europe and the United States that has led to budget cuts in science. In certain fields, these factors are augmented by supervisors' efforts to establish lasting partnerships with research groups in other countries, which have favored the increased international presence of laboratories in the past decade.

"Supervisors are usually key figures in attracting foreign researchers. They are selected by the grant recipients because they frequently attend international conferences or are becoming known

#### COUNTRIES OF ORIGIN OF POST-DOCTORAL RESEARCHERS

Number of post-doctoral grants awarded by FAPESP to researchers who had completed undergraduate studies abroad, by country of origin (2007-2012)



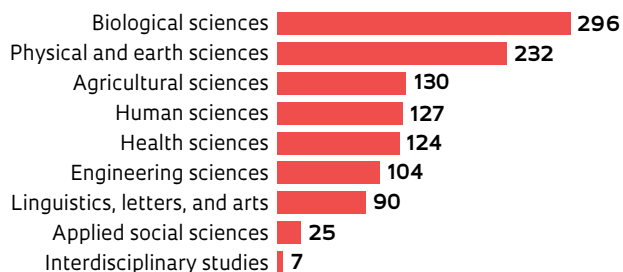
# Overseas Internships

Number of grants under FAPESP's Bepe program, by country of destination and major field (below) between October 2011 and May 2013



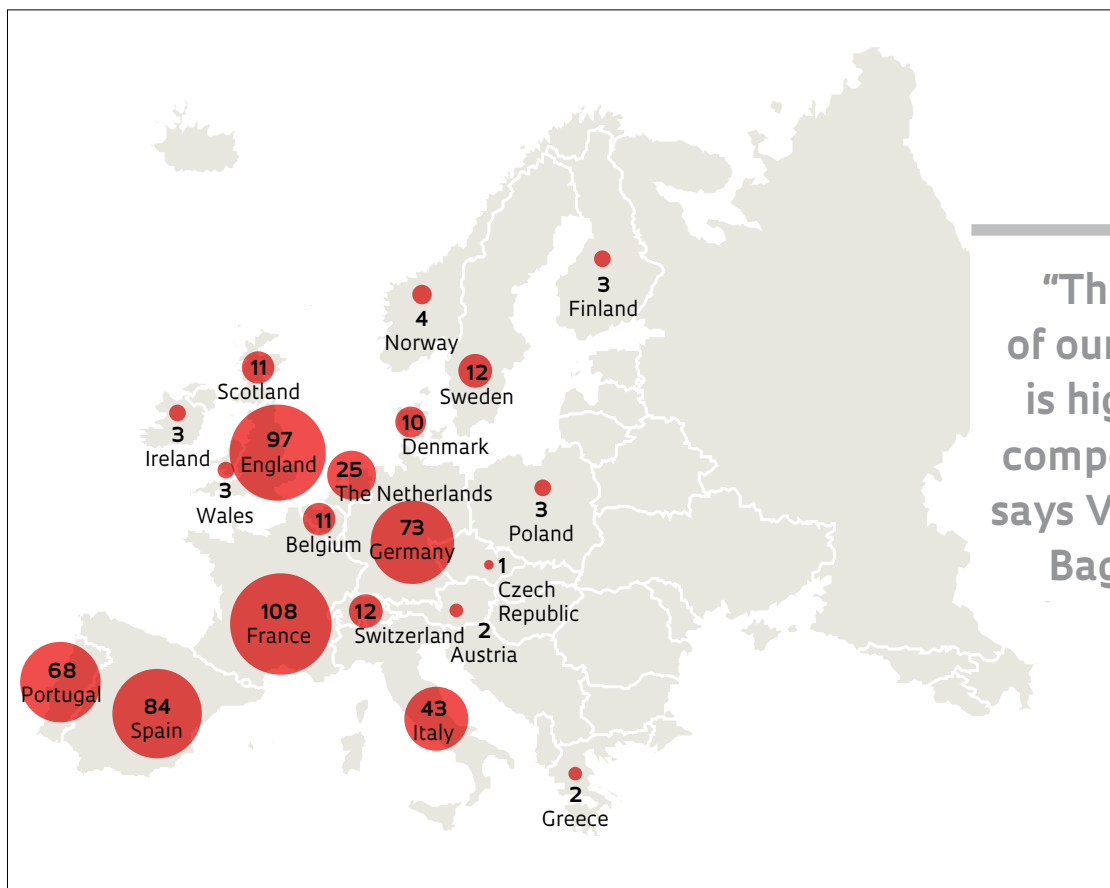
because of the quality of the articles they publish,” notes Edgar Dutra Zanotto, a researcher at the Center for Science and Technology at the Federal University of São Carlos (UFSCAR). Zanotto, who received the Admiral Álvaro Alberto Prize for Science and Technology this year, is known internationally as a leader in the study of kinetic processes in glass and vitrocereamics; he has already welcomed dozens of grantees from various countries to his laboratory. However, scientific progress is not the only decisive factor in attracting the attention of good researchers from other countries. The structure in place for the researchers work must also satisfy their expectations. These individuals usually trained at well-regarded universities and research institutions. “In physical sciences, laboratory structure is vital if one is to receive researchers from abroad,” Vanderlei Bagnato agrees. He is a professor at the São Carlos Institute of Physics (IFSC) at the University of São Paulo (USP). “Along with organizational structure, we see that the size of our grants is also considered to be high and competitive,” says Bagnato, who recently helped organize an event at IFSC that was attended by five Nobel Prize recipients (see *Pesquisa FAPESP Issue N° 205*).

In the context of internationalization, in 2009, FAPESP created the São Paulo School of Ad-



vanced Science program, a type of support that seeks to increase the international exposure of areas of São Paulo research that are already competitive on the world scene. The program offers opportunities for São Paulo researchers to organize short courses to which they invite researchers from São Paulo and different parts of the world. The audience for the courses must be made up of undergraduate and graduate students as well as young PhDs, at least half of whom are to be recruited from outside Brazil. One objective is to showcase the opportunities for research in São Paulo and attract the best students and researchers from abroad.

The prominence achieved by the physical sciences can be explained by the pioneering efforts of certain groups, such as Bagnato's, which study quantum turbulence in Bose-Einstein condensates – the name given to a group of atoms or



“The size of our grants is high and competitive,” says Vanderlei Bagnato

molecules that, when cooled to temperatures near absolute zero, begin to behave like a single entity. Because of these pioneering efforts, U.S. researcher Kyle Joseph Thompson, after completing his doctorate at the University of Florida in Gainesville, asked Bagnato to supervise him in his post-doctoral work in Brazil. “I decided to study turbulence in quantum fluids and after an exhaustive search, I discovered that Professor Bagnato’s group at USP was the most renowned in that subject,” says Thompson. “Here, in Brazil, I am working alongside people from various parts of the world using the most modern methods and technologies that exist,” he adds.

In areas such as health sciences, although the number of researchers from other countries is rising, the percentage of grant recipients who had completed their undergraduate work abroad is still low. Of the 61 post-doctoral grants awarded by FAPESP in 2007 in health sciences, two were given to researchers from other countries. However, in 2012, the number of grants awarded had risen to 111, of which six were for post-doctoral researchers from abroad. “The truth is there is repressed demand. There are many more young PhDs in other countries who could benefit from the experience of working in Brazil,” argues Carlos Augusto Monteiro, professor and researcher in the field of nutri-

tion at USP’s School of Public Health and one of the people in São Paulo responsible for recruiting researchers from other countries to the health field. Currently, Monteiro is supervising the post-doctoral work of a young Canadian anthropologist, a graduate of the University of Montreal. Monteiro is also waiting for an answer from FAPESP on the grant application filed by a Colombian, who finished his PhD at the University of Washington. According to Monteiro, the health sciences are receiving few researchers from other countries because, perhaps, the Brazilians have not been active enough in publicizing the availability of openings and grants at events and doctoral programs in other countries.

#### AGGRESSIVE PROMOTION

Among the steps taken by Monteiro to attract good candidates from abroad is a more aggressive publicity campaign that clearly communicates his willingness to welcome grant recipients. His group has developed a singular line of research that explores relations between changes in the global food system, diet quality, and the current pandemic of obesity. Canadian Jean-Claude Moubarac, who holds a PhD in public health, was uncertain what his post-doctoral research subject would be or where it would be performed until he read an article by Monteiro in an inter-

national scientific journal. “From that moment on, I realized that we shared interests and common world views about health and nutrition,” he says. In São Paulo since 2011, Moubarac now recognizes that he chose the right place to do his work. “Researchers in public health in other countries would benefit from learning more about the Brazilian experience,” he says.

In other cases, the secret to attracting intelligence is to maintain active communications with research institutions and groups in other countries, even if the fruits of those relationships take a while to appear. “Two years ago, I put out a call for three post-doctoral grants. I received 16 proposals from applicants. Incredibly, all were from outside Brazil,” reports Marco Antonio de Avila Zingano, professor at the USP Faculty of Philosophy, Languages and Literature, and Human Sciences. Now, Zingano is supervising four post-doctoral research grantees from abroad. His group, devoted to ancient philosophy, is now part of the core international academic group that is studying the subject and participating in networks of dissemination and publication on the Internet that connect Latin America, Europe, and the United States. “This active participation in the international scene was crucial when it came time to publish the request for proposals years ago,” Zingano says. In 2007, FAPESP awarded 50 post-doctoral grants in human sciences, and three of the researchers came from abroad. By 2012, 69 grants were awarded, six of them to post-doctoral researchers from other countries.

#### RESEARCH NETWORKS

“Traditionally, human sciences are marked more by the departure of Brazilians for foreign shores than by the arrival of researchers from elsewhere”, observes Paula Montero, president of the Brazilian Center for Analysis and Planning (Cebap) and an assistant coordinator at FAPESP. She explains that in anthropology, for example, internationalization is vital to ensure that progress is made through the establishment of comparative research networks. In the past ten years, this internationalization has enabled Brazil to advance in collaborative research by increasing its participation in global debates surrounding anthropology. “The hardest part, however, is to cause these reflections that are typical of peripheral countries to have an impact on the dominant countries,” says Paula Montero.

According to Zingano, recruiting researchers from abroad must continue to be an objective because it has a positive impact on the research groups that receive them. “Brazilian students and researchers in training who live and work with post-docs learn new procedures and come to realize that they need to be more professional,”

he says. The economic crisis in the United States and in Europe has favored the arrival of researchers in the humanities who, if conditions at home were more favorable, perhaps would not end up in Brazil. This is the case of Evan Keeling, an American from West Virginia, who came to do research alongside Zingano in 2011. Escaping the economic crisis in his own country, he unexpectedly found very good conditions for researching and taking part in discussions about ancient philosophy at USP. “São Paulo is becoming more attractive to academicians from other countries. With respect to ancient philosophy, Professor Zingano’s published works are respected both in the United States and in Europe and that also influenced my choice,” says Keeling, who believes that Brazil would attract more researchers if it invested in publicizing grants and found ways to reduce the bureaucracy involved. Venezuelan Simon Noriega Olmos, another researcher supervised by Zingano, recalls that the process of obtaining documents from the Federal Police was discouraging. When Canadian Jean-Claude Moubarac needed to rent an apartment as soon as he arrived in São Paulo, he encountered obstacles that made it difficult to obtain permission to live on his chosen property. Help came from his supervisor, researcher Carlos Augusto Monteiro. “I had to rent the apartment in my name,” says Monteiro.

With regard to agricultural sciences, José Roberto Postali Parra, professor at the Luiz de Queiroz College of Agriculture at USP and assistant coordinator in life sciences at FAPESP, says that although Brazil is considered to be a leader in tropical agriculture and has developed its own technologies, so much progress is being made today in biotechnology and biochemistry worldwide that Brazil is forced to seek out researchers and obtain knowledge from other countries. However, the field of agricultural sciences receives the fewest post-doctoral FAPESP research grantees

Post-doctoral researchers Evan Keeling, American, and Jean-Claude Moubarac, Canadian, were attracted by the quality of research being conducted in ancient philosophy and nutrition at the University of São Paulo



PHOTOS LÉO RAMOS



Omar Mertins learned new methods abroad that he can apply in Brazilian laboratories

from abroad. Only 22 grants were awarded to researchers from other countries between 2005 and 2012. During the same period of time, this number is less than the grants given to foreign researchers in fields such as human sciences, which recorded 41, and engineering, with 77 post-doctoral grants.

#### IN THE OPPOSITE DIRECTION

The arrival of researchers from other countries is accompanied by a departure of Brazilian students and researchers, who are headed for internships in other countries. Between October 2011 and May 2013, FAPESP awarded 1,135 grants through the Research Internships Abroad (Bepe), a program designed to encourage undergraduate, masters, doctoral and post-doctoral researchers from São Paulo to internationalize their research. The primary destination for these internships, which vary from one month to six years, is the United States. Between October 2011 and May 2013, the U.S. received 420 grantees from São Paulo who were funded by FAPESP; 136 worked in the biological sciences and 80 in the physical sciences. France received 108 grantees, with most (27) from the field of human sciences (*see graph*).

According to Walter Colli, professor at USP and an assistant coordinator in life sciences at FAPESP, the most successful element of the Bepe program is that it requires grant recipients to develop their work abroad in accordance with the line of research they are conducting here in Brazil. "FAPESP requires the internship to be comple-

mentary to the work already done in Brazil," he explains. With respect to engineering, José Roberto Arruda, professor at the School of Mechanical Engineering at the University of Campinas (Unicamp) and an assistant coordinator at FAPESP in physical sciences and engineering, says the Bepe program enables the researchers to enrich their training, particularly by working in the context of scientific practices that are often more objective and well-established. "The program also fulfills the function of attracting good students by giving them the chance to grow as researchers and as individuals through the experience of an internship in a foreign country," Arruda says.

When Omar Mertins, a post-doctoral researcher at USP's Institute of Physics, decided to embark in June 2012 for Strasbourg in eastern France, the objective was to learn new procedures without which he would be unable to move

forward with his research on systems that simulate biological membranes. During the seven months that he was an intern at the Charles Sadron Institute, Mertins became acquainted with the pipette micromanipulation technique, which is indispensable for evaluating physical aspects of the lipid membrane studied under luminous irradiation. "We brought that technology to Brazil; it was unheard of here," the researcher says. He accumulated additional experiences abroad when he interned first in France during his doctoral work then in Germany as a post-doctoral researcher.

**"Sao Paulo is becoming more attractive to researchers from other countries," says Evan Keeling**

Doctoral student Aline Silva Mello Cesar, at the Luiz de Queiroz College of Agriculture at USP, benefited from a previous partnership between her advisor in Brazil and the laboratory in the United States where she spent a year as an intern. Mello Cesar returned in June from her experience at Iowa State University, where she encountered a new technology for RNA sequencing and genomic association. "Here in Brazil we have equipment for performing that procedure but not for organizing the results," the student explains. She studies the identification and characterization of genes associated with the deposition and composition of intramuscular fat in Nelore cattle. Thanks to the internship, Mello Cesar was able to present the preliminary findings of her project at international conferences. "Every researcher should have the chance to go abroad and bring back new knowledge to Brazilian science," she says. ■