

## SPOTLIGHT ON LATIN AMERICA

# Latin America: Investing in innovation

Countries across the region are coming up with smart ways to turn science into innovation for the benefit of society

*“Bigger countries in Latin America are recognizing that they have to invest in science and technology to create a core of innovators.”*

*Johanna Mendelson Forman, Center for Strategic and International Studies*

**WHEN BIOLOGIST** Luis Rafael Herrera Estrella first became interested in the bacteria that live in Mexico’s Cuatro Ciénegas desert, his aim was to answer an academic question: whether that valley had been a sea 90 million years ago. But his studies led to something much more practical – an agro-biotech company, which could help reduce the worldwide use of toxic phosphorus fertilizers, of which reserves are much depleted.

By sequencing the DNA of Cuatro Ciénegas microbes, Herrera and his team confirmed their marine origin. They also found that some had a gene which made them particularly efficient at extracting food from environmental phosphorus. A renowned expert in transgenic plants, Herrera introduced the bacterial gene into tobacco, corn, and soy, and found that the plants became better at extracting phosphorus, boosting the efficiency of phosphorous fertilisers. Keen to exploit this discovery into a viable business, Herrera co-founded the Stela Genomics company in 2012.

Herrera, director of the National Laboratory of Genomics for Biodiversity (Langebio) in Irapuato, Mexico, is one of a growing number of Latin American scientists bridging a long-standing regional gap between basic research and its social and commercial applications.

Latin America ranks only second to Africa in number of patent files – a proxy measure for innovation capacity – according to the World Intellectual Property Organization. And data from the Ibero-American and Inter-American Network of Science and Technology Indicators (RICYT) suggests R&D expenditure of companies in the region has changed little in recent years.

Yet change is underway. “In bigger countries, like Chile, Brazil,



Dr. Roberto Tapia-Conyer, CEO of the Carlos Slim Foundation in Mexico.

or Mexico, there is a growing recognition that they have to invest in science and technology to create a core of innovators,” says Johanna Mendelson Forman, senior associate of the Center for Strategic and International Studies, a non-profit organization in Washington DC. Jesús Sebastián Audina, at the National Council for Scientific Research in Madrid, agrees. “Until now, most of the innovation has been based on buying foreign technology, rather than on local research,” he says. “But the culture of getting closer to companies has grown in universities in the last few years.”

Brazil is taking the lead in the region, investing the highest proportion of GDP in research,



especially the state of Sao Paulo, which publishes around half of Brazil's research papers. The state constitution stipulates that 1% of revenue must be earmarked for the Sao Paulo Research Foundation (FAPESP). In 2012, the Foundation had a budget of US\$559 million, and funded 11,000 graduate students and postdocs. It places importance on translating that research into innovation, explains Carlos Henrique de Brito Cruz, FAPESP's scientific director. "In all our calls [for applications to funding schemes] we make clear that we expect scientists to be alert about opportunities to transfer knowledge to society," he says.

This expectation is also reflected in the funding opportunities offered by FAPESP. The University-Industry cooperative research program co-finances applied science projects with more than 100 companies, including the aircraft manufacturer, Embraer, Agilent, which makes scientific

measuring equipment, the car makers Peugeot Citroen, and Microsoft. The Small Business innovative research program has funded 15,000 small companies since 1998. Each year since 2000, FAPESP has also financed a number of Research Innovation and Dissemination Centers, which bring together around 600 scientists from Brazil and around the world. The research centres, which are often co-hosted by several universities, focus on translating knowledge from a broad range of scientific disciplines into practical applications. In its second funding round this year, FAPESP selected 17 RIDCs, which will collectively receive US\$370 million for up to seven years.

### Start-up smarts

Innovation efforts extend beyond Sao Paulo; this year the Ministry of Science, Technology, and Innovation launched Startup Brasil, which matches young



The Sao Paulo Research Foundation (FAPESP).

tech start-ups with accelerators – private companies with investment capacity. The program aims to incubate 150 start-ups over the next three years, and

encourages foreign companies to apply, as a quarter of those selected will be international.

Brazil's programme mirrors a similar scheme, Start-up Chile, »

**Institut Pasteur de Montevideo**  
SCIENCE THAT CHANGES THE FUTURE

**Opportunities for entrepreneurs**

The **Institut Pasteur de Montevideo (IP Montevideo)** is launching **BIOESPINN**, the MERCOSUR Innovation Space Bioincubator, built with the financial support of FOCEM, especially designed to incubate innovative projects generated by SMEs and entrepreneurs in biotechnology.

We are recruiting highly innovative projects in biotechnology mainly in the following fields:

- production of recombinant proteins
- recombinant vaccines
- cell technology
- biopharmaceuticals
- protein engineering
- genomics & bioinformatics
- diagnostic methods

Companies and entrepreneurs will have access to the IP Montevideo Technological Facilities, technical assistance to ensure the success of their businesses and consulting services in marketing, finance, business plan and intellectual property.

**Deadline for Applications:** November 30, 2013  
**Additional information at:**  
<http://www.pasteur.edu.uy/index.php/en/bioincubator>

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**Laboratorio Nacional de Genómica para la Biodiversidad**

**Core Facility Heads, Langebio-CINVESTAV, Mexico**

The National Laboratory of Genomics for Biodiversity of Mexico (Langebio) is a Unit of the "Centro de Investigación y de Estudios Avanzados" (CINVESTAV), a Federal Government Institution devoted to basic and applied research. Langebio's mandate is to conduct top-ranked research and graduate education, to provide genomic services to other national institutions, and to promote genomic knowledge for the protection and sustainable use of Mexican biodiversity ([www.langebio.cinvestav.mx](http://www.langebio.cinvestav.mx)).

Research at Langebio is conducted by an international team of scientists, with an emphasis on collaboration and multidisciplinary studies. Scientists at Langebio have access to state of the art computational and wet lab facilities.

Langebio is currently recruiting three scientists to become Heads of the following Core Facilities: Mass Spectrometry, Genomics, and Bioinformatics. The primary responsibilities of these positions include optimization of current platforms, development of new applications, evaluation of new technologies, implementation of quality control systems, and management of personnel, in order to provide cutting-edge services.

Core Facility Heads will be offered tenure track Faculty positions at CINVESTAV. Thus, in addition to the service responsibilities, an important component of the positions will be to perform original research and training of graduate students, either within their own group of research or in collaboration with other Faculty at CINVESTAV. The successful applicants will be encouraged to develop novel methods and applications using omics or bioinformatics technologies that can be used within the Core Facility and also published.

Essential requirements for these positions include:

- A PhD in relevant disciplines (Biochemistry, Genomics, Bioinformatics...)
- Ability to manage both a service program and an independent research program
- Excellent verbal and written communication in both English and Spanish.

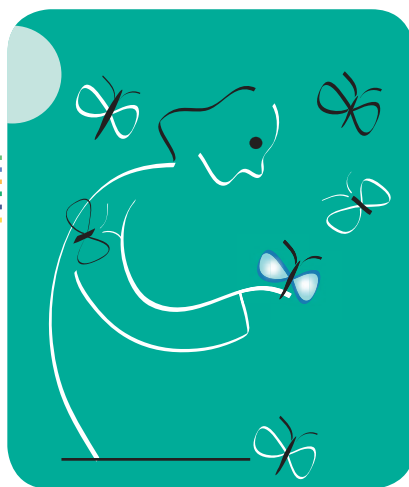
CINVESTAV offers a competitive salary and benefits, and an excellent academic work environment. Applications from women are encouraged.

**Specific requirements and offered support for each of the positions can be found at** [www.langebio.cinvestav.mx/calls\\_2013](http://www.langebio.cinvestav.mx/calls_2013)

**Applications will be received until November 30, 2013. Positions are intended to start during 2014. Send applications to the attention of Dr. Luis Rafael Herrera Estrella, Langebio-CINVESTAV, Irapuato, Guanajuato, MEXICO. Email: [mbernal@langebio.cinvestav.mx](mailto:mbernal@langebio.cinvestav.mx)**

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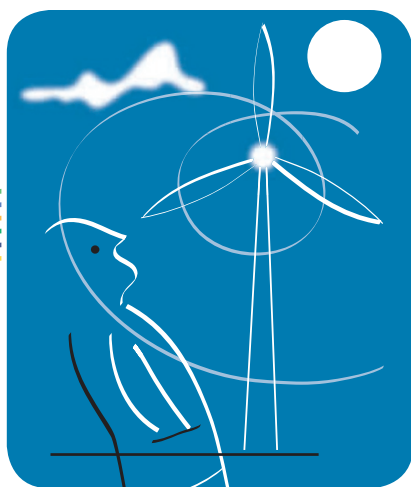
# Postdoc and research **opportunities** in Brazil



Fifty percent of all science created in Brazil is produced in the State of São Paulo. The state hosts three of the most important Latin American universities: Universidade de São Paulo (USP), Universidade Estadual de Campinas (UNICAMP) and Universidade Estadual Paulista (UNESP). Other universities and 19 research institutes are also located in São Paulo, among them the Technological Institute of Aeronautics (ITA), the National Institute for Space Research (INPE) and the National Synchrotron Light Laboratory (LNLS), besides most of Brazilian Industrial P&D.

The São Paulo Research Foundation (FAPESP), one of the leading Brazilian agencies dedicated to the support of research, has ongoing programs and support mechanisms to bring researchers from abroad to excellence centers in São Paulo.

The **Young Investigators Awards** is part of FAPESP's strategy to strengthen the State research institutions, favoring the creation of new research groups. See more about it at [www.fapesp.br/yia](http://www.fapesp.br/yia).



FAPESP **Post-Doctoral Fellowship** is aimed at distinguished researchers with a recent doctorate degree and a successful research track record. The fellowship enables the development of research within higher education and research institutions in São Paulo. Postdoc fellowships are available when calls for applications are issued internationally, or as individual fellowships requested on demand.

In the first case, positions are advertised at [www.fapesp.br/opportunidades/](http://www.fapesp.br/opportunidades/) and candidates are selected through international competition. In the second, the proposal must represent an addition to a pre-existent research group and should be developed in association with faculty in higher education and research institutions in São Paulo. More information at [www.fapesp.br/en/postdoc](http://www.fapesp.br/en/postdoc).

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SÃO PAULO RESEARCH FOUNDATION  
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## Back in Brazil

Victor and Ruth Nussenzweig, both 85 years old and married for 60 years, are pioneers of malaria research. The couple built their careers at New York University, having fled their home country, Brazil, in 1963, to escape a coup d'état, like other leading scientists did. But since 2010 they have spent 12 weeks per year in Brazil advising scientists at the Federal University of São Paulo on malaria research.

The arrangement is thanks to the Sao Paulo Excellence Chair, a program developed by the Sao Paulo Research Foundation (FAPESP), which offers grants to senior scientists with permanent positions abroad to spend three months of the year in Sao Paulo for five years, in order to stimulate new research groups there. This is just one of a number of activities which FAPESP is undertaking in order to foster collaborations with research groups outside of Brazil, predominantly in the US, the UK and Japan. "FAPESP is putting a lot of effort, money, and ideas into improving science in Brazil," says Victor Nussenzweig.

The couple's own research has led to the basic concept of the PfSPZ malaria vaccine, which showed promising results earlier this year against malaria caused by *Plasmodium Falciparum*. Back in Brazil, the Nussenzweigs hope to generate similar success against another strand of malaria, caused by *Plasmodium Vivax*. And so far, the results look promising; Ruth Nussenzweig is mentoring a group that has already filed a patent based on research in this field. Which just goes to show, says Victor Nussenzweig, that by looking to expertise from the outside country, Brazil is in turn laying its own innovation foundations.

which was set up in 2010 by the Chilean Economic Development Agency (CORFO) – a public organization devoted to steering innovation – with the ambition of making Chile the innovation hub of Latin America. CORFO lures foreign start-ups to Chile with the offer of US\$40,000 of equity-free seed capital and a temporary visa. Now in its eighth year, more than 750 companies have been selected for the program, with most foreign entrants coming from the US, Argentina, and India.

Dubbing 2013 as Chile's "Year of Innovation," the government is also channelling unprecedented funds into innovation – almost US\$ 1 billion in 2013 compared to US\$300 million in 2005. In 2012 it also updated its tax

credit laws allowing companies to claim a 35% tax credit on all R&D expenditures.

### Innovation for health

Healthcare is one sector benefiting from Latin America's innovation push. In Mexico, the Carlos Slim Foundation – a charitable foundation for science and education, created by the billionaire owner of the business group Carso – has set up a health institute which focusses on kick-starting innovations that translate research into material benefits for people, says the foundation's CEO Roberto Tapia-Conyer.

For instance, the Institute's Genomic Medicine project has budgeted US\$139 million dollars to find genes associated with



The National Laboratory of Genomics for Biodiversity (Langebio) in Irapuato, Mexico

diabetes and breast cancer in the Latin American population, and has filed six patents concerning the research. To help meet its aims, the institute has paid for 9500 student fellowships in the past five years and has set up a virtual Center for Health Education that provides free online courses to scientists and doctors.

In 2006, the Uruguayan Pasteur Institute was set up in Montevideo as part of a network of 32 independent centres under the auspices of the French Pasteur Institute. By the end of 2014, the institute, with 150 employees plans to open the first Good Manufacturing Practices (GMP) plant for academic-industrial codevelopments in South America: a 200 square meter laboratory for the production of small lots of recombinant proteins for applications in human and animal health.

In November the institute also plans to open a bio-incubator with space to host eight start-ups and 15 potential entrepreneurs who will be mentored. "According to the last census, there are only 60 biotech companies in Uruguay, so the bio-incubator will trigger a significant increase," says Atilio Deana, head of the institute's technology transfer unit.

Applied research is also an integral part of the Cuban Neuroscience Center (CNEURO), in Havana, which promotes the use of computers to improve the brain's health. "We evaluate our scientists not only through

the h-index, but also through indicators of their impact on public health," says Pedro Valdés Sosa, the institute's director.

### Seeding business

At Langebio, the discovery of the phosphorus processing gene that led to the foundation of Stela Genomics is just one innovation successes. Created in 2005 as a branch of Mexico's Center for Research and Advanced Studies of the National Polytechnic Institute (CINVESTAV), with the remit of studying Mexico's biodiversity, its plant genetics research has attracted US\$2.3 million in investment from the seed company, Pioneer Dupont.

To capitalise on these innovation successes, Latin America now needs to refine its strategies, says Sebastián Audina, by establishing priorities "on a few, strategic sectors in which each country has chances to be competitive in the short or mid-term." Key goals which must now be met are "better fiscal policies to collect funds for research, a better public-private partnership, better protection of intellectual properties, and a better knowledge of English," says Mendelson Forman. "It's a generational change and it will not be overnight, but I am hopeful," she says. "In 30 years in the field I had never heard so much talk about science and technology in the Americas as now." ■

*Nature editorial staff have no responsibility for content*



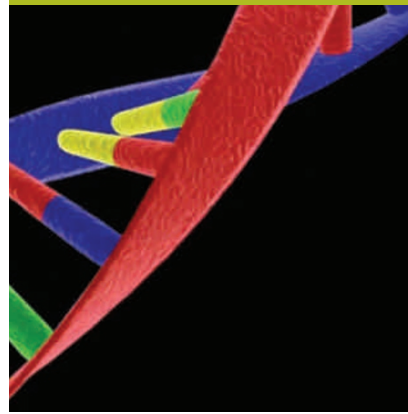
## The Cuban Neuroscience Center

The Cuban Neuroscience Center carries out Brain Research and develops Neurotechnologies to protect the Mental Health of Nations. Several countries have benefited from our programs for screening and attention of hearing loss, neurodevelopmental disorders of childhood, learning disabilities, as well as in aging and dementias. We seek collaborations.

**For information, please contact: [cneuro@cneuro.edu.cu](mailto:cneuro@cneuro.edu.cu)**

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## Investment in innovation

# a healthy return

From neglected diseases to genomic research, the **Carlos Slim Health Institute** is continuously establishing alliances to develop and implement innovative solutions to health issues afflicting Latin America's most vulnerable populations.

**We fight poverty-generating diseases** through the Slim Initiative for Vaccine Development working with partners such as Baylor University, the Sabin Vaccine Institute, University of Yucatan and the CINVESTAV research center to develop vaccines to prevent Leishmaniasis and Chagas disease.

**By working with** the Bill and Melinda Gates Foundation and the University of San Francisco in Project FIRST (Fighting Infections with Research, Science and Technology) we contribute to the development of mobile health technologies to manage the threat of dengue fever, as well as of new drugs for onchocerciasis and Chagas disease

**We have pledged ourselves** to international efforts such as the Global Polio Eradicating Initiative and the work being done by the Carter Center to stop onchocerciasis in Latin America.

**The Slim Initiative for Genomic Medicine**, a joint project with the Broad Institute of Harvard and MIT and 15 national institutions including Mexico's National Institute of Genomic Medicine, has achieved historic results by identifying the genetic origins of Type 2 Diabetes and several types of cancer in Latin American population. We are now working to translate research into practical diagnostic and therapeutic solutions available to all.

**Salud Mesoamerica 2015 (SM2015)** is an unprecedented alliance with the Bill and Melinda Gates Foundation, the Inter-American Development Bank and the governments of Central America and the Mexican state of Chiapas. SM2015 addresses the equity gap in the region by broadening health coverage and improving the quality of services in maternal and child health, nutrition and immunizations where, among other innovations, we are working on an electronic vaccination card to optimize and improve the quality of information systems.



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[www.salud.carlosslim.org](http://www.salud.carlosslim.org)

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The Institute of Chemistry is one of the premier research centers in South America, with well-equipped facilities for chemical analysis and characterization and for genomic, cell and structural biology and with superb on-line access to the international scientific literature. Talented undergraduate and graduate students and postdoctoral associates are an integral part of the research programs of the faculty, funded by Federal and State granting agencies and Industry. These unique characteristics make the Institute an exciting and intellectually stimulating environment in which to carry out world-class teaching and research. For detailed information regarding tenure-track job opportunities and openings for post-doctoral associates and graduate students, please visit our website at:

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