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Miguel Nicolelis

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Building Up Brazilian Brain Research

Miguel Nicolelis was educated in his native Brazil, came to the United States for his postdoc, and stayed on as a faculty member at Duke University in Durham, North Carolina. After making a splash at Duke, he returned to Brazil -- maintaining his Duke appointment -- determined to use science as an agent of social transformation.

Nicolelis grew up near São Paulo, the largest city in Brazil and, indeed, in South America. In 1984, he received a doctorate of medicine from the university's medical school. Five years later, he completed a doctorate in physiology.

In seeking a site for his new institute, he focused on Brazil's northeastern corner, one of the country's least developed regions and home to one of the largest concentrations of rural poverty in Latin America.

In 1989 Nicolelis came to America, accepting a postdoctoral position at Hahnemann University in Philadelphia. Upon completing his postdoctoral work, Nicolelis faced a stark choice: Return to Brazil, where research positions and funding opportunities were nearly nonexistent, or remain in the United States. He chose the latter, accepting a faculty position at Duke University.

In 2003, Nicolelis's Duke lab gained international attention by showing that monkeys could move robot arms with just their thoughts, feeding electrical impulses from their brains into a computer linked to robotic arms.

Science in Northeastern Brazil

This article is part of a feature focused on doing science in northeastern Brazil. For more information on this topic, read:

- **Science in Northeastern Brazil (http://sciencecareers.science**… (An Introduction)
- **Shifting Sands in Northeastern Brazil (http://sciencecareers.science**…
- **Brazil's Science Culture Shock (http://sciencecareers.science**…

When Luiz Inácio Lula da Silva, the newly elected Brazilian president, announced his intention to double Brazil's research spending, Nicolelis decided to build a state-of-the-art research facility in Brazil. While still working at Duke, he contacted the new government in Brazil to help line up support and began raising money from private sources, including a number of expatriate Brazilians. He later applied for, and received, funding from the Brazilian government.

In seeking a site for his new institute, he focused on Brazil's northeastern corner, one of the country's least developed regions and home to one of the largest concentrations of rural poverty in Latin America. Many local people lack access to educational and health facilities.

Nicolelis settled on a hilly site on the outskirts of Natal, the state capital of Rio Grande do Norte. Natal's approximately 1 million residents have long faced challenges to education, healthcare, and sanitation.

"When we saw this place, we realized that we could have an impact," Nicolelis says. When he opened the International Institute of Neuroscience of Natal (IINN) in 2005, the campus consisted of two rented buildings that were already on the site. Since then, three new buildings have been built. The campus now has a research lab, a science school serving children in the area, and a women's healthcare clinic where free prenatal care is provided.

Today, the women's clinic serves 12,000 women annually and plans to double that number within a few years. Two extracurricular science programs have been developed in the region, serving 5000 children. The retention rate for students in the science program is near 95%, far above Brazil's high school retention rate, which hovers around 50%. "We're seeing

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Miguel Nocolelis in 2004, at the site of the new neuroscience institute.

for the first time that kids from this district are capable of passing the rigorous entrance exam and are being admitted into the public universities," Nicolelis says. Next year, another school will open in northeastern Brazil under the direction of IINN, providing educational opportunities to another 5000 kids.

Up and running

There has been progress on the scientific front as well. Since 2005, the institute has employed a dozen full-time researchers to carry out basic neuroscience studies in rats and primates. Research is now moving into the translational realm, as testing begins on a potential therapy for Parkinson's disease. The institute is also working on a robotic "exoskeleton" that could be worn like a suit so that people who lose control of all their limbs might become mobile again.

A new research building is scheduled for completion in 2012. Nicolelis plans to establish a graduate program that will bring more than 70 neuroscientists to Brazil to teach courses and collaborate on research. Eventually, he hopes to build an industrial research park focused on brain-related healthcare.

Not everything has gone smoothly. Last summer, 10 scientists who had been contracted by the neuroscience institute quit, citing delays in getting equipment and supplies. The scientists, who all had ties with a nearby university, returned to their academic posts. *Science* **reported (http://www.sciencemag.org/content/333/6045/929)** that 100 people left the lab but today Nicolelis says that in addition to the 10 PIs, the lab lost only 10 people, all graduate students. He has replaced those researchers with an international group of scientists, he says.

Nicolelis attributes those departures to frustration with the slow pace of progress. "Since the beginning we have made it clear that our institute and our foundation works to follow every single regulation of the country, no matter how difficult it is," Nicolelis says. "In this case, they didn't have enough patience for that." Meanwhile, he's working to make those regulations policies more flexible. Last year, he was appointed to head a commission called "Commission of the Future," which is charged with finding ways to reform Brazil's scientific system.

While some scientists in the region complain about the slow rate of change, Nicolelis sees many positive changes taking place. For example, he notes that last summer, the government announced the creation of 75,000 science and technology scholarships by the end of 2014. "We haven't yet reached our goal," he says, "but we're well on our way."

Susan Gaidos writes from near Portland, Maine

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