STRUCTURAL BIOLOGY

Brazil Network Sees the Light

Brazil hopes to make a name for itself in structural biology with talent and facilities that build on its sequencing of economically important genomes

RIO DE JANEIRO, BRAZIL—When Brazil decided to build up its genome sequencing capacity in the late 1990s, officials knew that the country didn't have the firepower to compete with the industrial giants. So it chose a niche—indigenous plants and bacteria—that was important to Brazil's public health and economy. The strategy worked: Last year its scientists made news by completing the first public sequence of a plant pathogen, the bacterium *Xylella fastidiosa*, which causes a disease that attacks citrus trees and other important crops.

That triumph has given it the confidence to stake a claim on the next frontier, that of functional genomics. Brazil is betting that its modest assets—a new structural biology network linked to the only synchrotron in the Southern Hemisphere—will be enough to produce the desired gains and give it a toehold in this expanding and already crowded field. Earlier this month, prominent scientists from around the world gathered* outside São Paulo to tour the facility and learn more about the network. But they warned government officials that the road ahead will be difficult.

"In today's competitive science, nobody is in a comfortable position," says Johann Deisenhofer, winner of the 1988 Nobel Prize in chemistry and a researcher at the University of Texas Southwestern Medical Center in Dallas. "Brazil appears to be on its way to participate in the scientific competition, but it has a way to go."

The Structural Molecular Biology Network encompasses 16 labs in the state of São Paulo. Set up this spring, the network is already expanding, with plans to extend an invitation next month to labs across the country to compete for one of 10 new sites. "First of all, we want to improve Brazil's capabilities in this area by contributing to the development of human resources," says Rogerio Meneghini, a biochemist and director of the Center for Structural Molecular Biology in São Paulo, which coordinates the network.

But the goal of creating a critical mass is quite ambitious, admits physicist Glaucius Oliva, conference organizer and a member of the network. "When the Brazilian genome program was started about 4 years ago, our country had a community of sequencing experts," says Oliva, a professor at the University of São Paulo. "All we had to do was toss out the seed and wait for the results to flower." The data bank contains a sizable portion of the sugarcane plant genome as well as the entire genomic sequences of *X. fastidiosa*, which attacks orange trees, and *Xanthomonas axonopodis* pv. *citri*, which causes the so-called citrus canker. In contrast, notes Meneghini, there are only about 20 structural biologists in all of Brazil.

The network is receiving $3.2 million over 4 years from São Paulo's Foundation for the Support of Research (FAPESP), the richest and most successful research agency in Brazil. The money will go for materials and equipment, with the expectation that industry will provide additional funds as part of its support for relevant projects. "It would be very helpful if the funding were higher," says conference speaker Wayne Hendrickson, a Howard Hughes Medical Institute investigator at Columbia University. "On the other hand, what it's important to do—as always when one has limited resources—is to focus appropriately. The focus that is emerging in Brazil is the one of tropical disease, which remains quite specific to the economic, social, and health situation in Brazil." Among the early targets will be proteins related to malaria, hepatitis B, and variants of HIV that are prevalent in Brazil.

Meneghini's center is set up to do the cloning, purification, and crystallization of proteins. The center is part of the National Synchrotron Light Laboratory (LNLS), a first-generation, 1.37–giga electron volt machine with room for 24 beamlines. The lab, with 10 beamlines now in operation, recently spent $1.5 million on two new nuclear magnetic resonance machines dedicated to protein analysis. Outside observers say that the components are in place for an impressive program but that more resources will be required.

"The facilities [at LNLS], especially the biological laboratories, are first-rate and not much different from U.S. labs," says Deisenhofer. "The [Brazilian] synchrotron is small in comparison with the third-generation machines in Europe, Japan, and the U.S., but it is a good focal point for a growing community in structural biology." Adds Hendrickson, "At this moment, [the machine] is not as strong as it needs to be in order to be competitive. But the abilities are here [to characterize proteins] in the same way the country has become competitive in sequencing."

Meneghini notes that FAPESP plans to invest another $3.5 million for upgrades that can deliver the high-intensity, hard x-rays needed for protein analysis and, in time, beam resolution comparable to the most powerful light sources in the world. In the meantime, network officials are drawing up a list of specific target proteins, much of which will be kept confidential because of the probable commercial value. "If a protein shows promise," says Meneghini, "we are going to patent first, then publish." He also promises to move quickly: "We'll have our first results by the end of the year." **–CASSIO LEITE VIEIRA**

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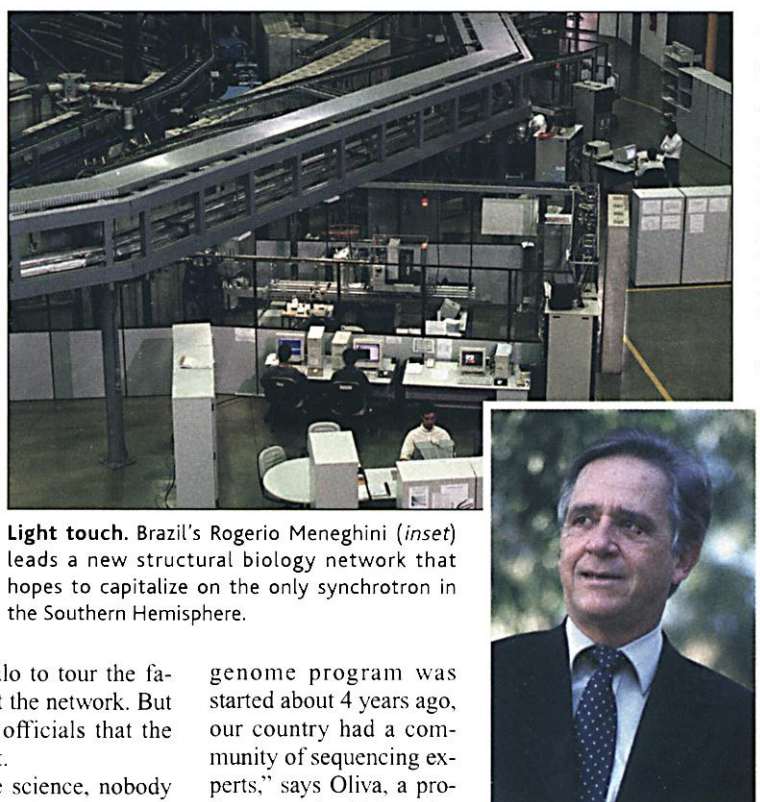

Light touch. Brazil's Rogerio Meneghini (*inset*) leads a new structural biology network that hopes to capitalize on the only synchrotron in the Southern Hemisphere.

CREDITS (TOP TO BOTTOM): MÁRIO BELLONI/LNLS; MIGUEL BOYAYAN/FAPESP

* The Seventh International Conference on Biology and Synchrotron Radiation, São Pedro, 30 July–4 August.