nature

www.nature.com/nature

Vol 466 | Issue no. 7304 | 15 July 2010

Brazil's biotech boom

Ten years ago, Brazilian bioscience was transformed by a bold initiative. Scientists and the government must develop and extend the progress that has resulted.

In May 1997, a pair of Brazilian scientists spent a weekend in the country discussing a bold idea. José Fernando Perez, the science director at the São Paulo Research Foundation (FAPESP), a state-funded agency and one of Brazil's leading research sponsors, had been looking for game-changing research initiatives. Biologist Fernando Reinach, one of his advisers, had a sufficiently adventurous plan: kick-start biotechnology research throughout Brazil by sequencing a genome.

For many risk-averse scientists in the old guard, who were acutely aware of how far the country lagged behind the rest of the world in biotechnology, this plan seemed overly ambitious. But the duo pushed ahead to build the capacity for genomics and bioinformatics that Brazil lacked, quickly organizing a team to conduct the project and then settling on a bacterium to sequence. FAPESP invested the equivalent of US$12 million, largely dedicated to sequencers, computers and reagents, while the team brought together and trained researchers from a range of fields to develop a broad and long-lasting set of skills and knowledge.

On 13 July 2000 that effort paid off when the team, by then comprising more than 100 researchers in 35 Brazilian labs, published the genetic code for the citrus pathogen *Xylella fastidiosa* in an article featured on the cover of *Nature* (A. J. G. Simpson *et al. Nature* **406,** 151–157; 2000). Ten years later, the fruits of that project keep coming.

Before its *Xylella* paper had even come out, for example, the network was busy sequencing another citrus pathogen while taking its first stab at the complex sugarcane genome and contributing to the international Human Cancer Genome Project. The same tools and expertise were repackaged for sugarcane research in Brazil's first major agricultural biotechnology enterprises: Allelyx (*Xylella* in reverse), which focused on genomics, and CanaVialis, which made innovations in conventional sugarcane breeding. The US-based biotechnology company Monsanto purchased both companies for US$290 million in 2008, and is now running its own sugarcane research centre in Campinas, São Paulo, where the companies were headquartered.

Brazilian biotechnology has matured to the point at which its scientists are players on the international stage. And FAPESP is still promoting big ideas, including a new programme to pump money into a broad portfolio of bioenergy research even as the Ministry of Science and Technology constructs a bioethanol research centre; both initiatives seek to build on Brazil's lead in this field. FAPESP is also working to overcome one of the biggest impediments to progress — a lack of doctoral researchers — by encouraging scientists to fill the gaps with young stars from the United States and Europe, part of a broader effort to internationalize Brazilian science.

All of this is good, but more efforts are needed in the same vein — more attitude, more risk-taking and more entrepreneurialism that puts public science into private practice, an area in which Brazil continues to lag. Universities and funding agencies must continue to advance technology-transfer programmes, and the government must streamline regulations that slow even simple activities such as purchasing scientific equipment from abroad. But if there is anything holding Brazil back, it is the same unjustified fear of failure that the country overcame ten years ago with *Xylella*. Although institutions can promote, fund and reward bold thinking, it is worth noting that *Xylella* was not simply a bricks-and-mortar research centre run by a foundation, but a science project. Ultimately the task of promoting Brazilian biotechnology comes down to the science, and it will be up to individual scientists to accept the challenge and expand their research horizons.

Perhaps more than anything, *Xylella* demonstrates the benefits of aiming high. Scientists undertook a major project, executed it with precision and published the results in English in a major international journal. The results were broadcast by mainstream media outlets worldwide, and Perez believes that this singular — and unexpected — outcome even helped to change Brazilian science's relationship with the Brazilian media. *Xylella* helped to change Brazil's perception of itself, its own capabilities and its place in the world of science. ■

Out in the cold

The parlous state of the US icebreaker fleet could soon put a freeze on the country's polar research.

On 25 June, the US Coast Guard announced that its only operational heavy icebreaker, the *Polar Sea*, was operational no longer. The ship had suffered 'an unexpected engine casualty' and limped back to its home port of Seattle, Washington, where it will undergo repairs until January 2011. A refurbishment in 2006 had supposedly extended its operational life to 2014. The announcement underscored the decrepit state of America's ageing icebreaker fleet — a situation with many troubling implications for the United States, not least its ability to carry out Arctic and Antarctic research.

The *Polar Sea* and its sister ship, the *Polar Star* — which is also in dry dock, undergoing a refurbishment scheduled to last until 2013 — are the only US ships able to cruise through ice up to 1.8 metres thick. Both are past their 30-year design life and are increasingly expensive to keep in repair. Yet no funds are available to replace them.

There is no mystery why. The Coast Guard's parent agency, the Department of Homeland Security, is focused on terrorism. The Coast Guard itself is overextended by its responsibility to protect American territorial waters and US operations in the Gulf in the Middle East. And the US Congress, faced with the estimated US$2 billion replacement cost for both vessels, has routinely found