Biotechnology book

Domini Stuart examines how Queensland’s natural attributes give it a head start in the business of biotechnology

From the Great Barrier Reef to the outback, exquisite beaches to virgin rainforest, an abundance of natural riches have made Queensland one of the world’s most popular tourist destinations. Now the same riches are driving a new export success story – biotechnology.

So what exactly is biotechnology? A dictionary definition - ‘the application of science and engineering to the direct or indirect use of living organisms, or parts or products of living organisms, in their natural or modified forms’ – fails to convey the enormity of its scope and potential. In fact, biotechnology might just have what it takes to solve some of the world’s most pressing problems. Through its influence on industries as diverse as agriculture, food production, biochemical engineering, mining, medicine and environmental management, biotechnology could have a positive impact on everything from crop yields to healthcare, energy production to waste disposal.

The Queensland Government was quick to recognise that the state could be a natural home for a major biotechnology industry. With 19 terrestrial bioregions, 17 marine bioregions and five world heritage regions covering 40 million hectares, there’s certainly no shortage of raw materials. As premier Peter Beattie points out, not only is Queensland is home to almost half of Australia’s 25,000 endemic floricultural species, just one hectare of Daintree rainforest contains more flowering tree species than the whole of North America.

Up to 80% of Queensland's marine and terrestrial species are found nowhere else on the planet. And Queensland Museum’s Centre for Biodiversity believes they have identified fewer than 25 percent of the state’s living creatures. Given that any number of the thousands waiting to be discovered might have a worldwide impact on agriculture, the environment or therapeutic drugs – and, ultimately, on Queensland’s economy – it’s easy to understand the Government’s eagerness to encourage research and development.

In the past six years, more than $2 billion has been invested in outstanding research projects and infrastructure. $270 million was invested in a 10-year Bioindustries Strategy for positioning Queensland as an international centre of excellence in biotechnology. At the same time, the limited size of Australia's domestic market made a global perspective essential from the outset. Growth would be impossible without collaborations for research and funding, and the Government has entered into a number of strategic alliances, most notably with New Zealand.

"The Beattie Government is very much focused on helping pave the way for our home-grown biotech companies to access world markets," says Minister for State Development and Innovation Tony McGrady. "We are promoting Queensland internationally with comprehensive Market Development programs aimed at showcasing Queensland's bioindustries to attract investors, scientists and other partners to the state."

The sweet taste of success

At first sight, honey seems to have no place in the world of cutting-edge biotechnologies. Used as a folk medicine for thousands of years, when antibiotics came along it was relegated to the rank of tasty placebo. Then an Australian company found that the honey made from certain trees had powerful and measurable antibacterial properties, and that many of those trees are not only native to Queensland, but are found nowhere else on earth.

Medihoney™ Pty Ltd is now a world leader in the clinical research and marketing of medical honeys. Already in use for skin care, wound management, mouth and throat care and ophthalmology, new research carried out at the Royal Brisbane Hospital has shown that honey is also effective against highly infectious and antibiotic-resistant infection 'superbugs' including staphylococcus aureus. More familiarly known as golden staph, this is the cause of potentially fatal secondary infections in hospitals around the world.

"A report in the UK says that as many as 100 people are there are dying every week as a result of these superbugs," says Anthony Maloney, Medihoney's CEO. "Medihoney is fast proving its potential to provide a natural solution. And laboratory tests have also proven that there is no sign of the superbugs developing resistance to the honey-based treatment."

Medihoney is a wholly-owned subsidiary of Capilano Honey, which exports to 38 countries. "It was natural for us to think outside Australia," says Maloney, "and the Government has been helpful in providing both information and contacts. We were the only Australian company with a stand at the recent 2nd World Union of Wound Healing Societies 2004 in Paris – one of the largest in the world. And it was Peter Beattie who launched Medihoney in the United Kingdom as part of the Smart State initiative."

Medihoney has also been actively participating in clinical trials and investigations in North America, Europe and South East Asia, with appropriate approvals expected soon. The economic potential of such an inexpensive alternative to antibiotics in the treatment of wounds and drug-resistant infections have barely begun to be realised.

Creeping towards a cure

Huge, hairy and the stuff of most people's nightmares, tarantulas aren't exactly easy to overlook. Yet, when Stuart Douglas began caring for and breeding them in the mid eighties, there was still a widespread belief that no tarantulas were native to Australia.

The fact that some of the world's largest spiders could go undetected for so long supports the idea that there is still much to discover. The fact that Australian tarantulas are already endangered, and that some may already be extinct, emphasises the dangers inherent in biodiscovery.

The problem is that tarantulas are sought after as pets by people willing to pay high prices – high enough prices to tempt greedy poachers with little regard for the animals' future. "Some of these spiders are adapted to remote and very specific microclimates – perhaps just one valley,' Douglas explains. "If someone takes them all, that's it."

Passionate about spiders since he was a child, Douglas believes that even the most deadly creatures have a positive role to play. This led him to explore the healing capabilities of some of the world's most toxic venoms. His business, Australian Tarantulas, is the only registered company which specialises in breeding tarantulas and scorpions for biopharmaceutical research .

Douglas has a close relationship with Dr Jamie Seymour at James Cook University, where he extracts and purifies venom for pharmaceutical screening. Although it's often sent overseas, mainly to the US and France, the venom isn't for sale.

"If I sold it as a product and it was used to develop a drug that made millions of dollars, none of the benefits would ever reach Australia," he explains. "Instead I look for world leaders who are prepared do the screening under contract. Our aim is to get a pharmaceutical drug on to the lucrative US market. A contract will ensures that the profits flow back here."

From horse to human

Plasvacc's directors are also keen to get more of their products into America. A privately owned pharmaceutical company, Plasvacc produces and distributes high quality plasma and plasma-based products which reduce the length and intensity of drug therapy in animals. Established in 1996 to manufacture plasma products for treating horses, Plasvacc is the only commercial producer of plasma for veterinary use in Australia.

Their plan is to buy a similar concern in America. "We want a business with the right distribution network already in place," explains CEO Andrew McArthur. "That way we can continue manufacturing in Australia and exporting from here to there.

"We're just 90 minutes from the airport and the Port of Brisbane, so our turnaround time into Los Angeles is just 21 days. Not bad considering we're in a rural environment, with room to expand and the space our donor animals need. And the fact

that Australia is ‘clean and green’ - free from diseases like rabies and foot & mouth – is another positive when it comes to exports.”

The techniques developed by Plasvacc to manufacture high quality plasma products have been recognised globally, and products are currently being supplied to over 400 clients in Australia and overseas. But this is just one aspect of the business.

“Our goal is to develop antibodies that will save human lives,” says McArthur. “But research is expensive. We’re developing and selling products so that we can afford to pay for it.”

Plasvacc’s new purpose-built production and laboratory facilities support basic R&D and trial work, and they have a close relationship with two Queensland Universities. Plasvacc has also entered into a number of collaborative research and development projects, including an agreement to supply major life sciences company CSL with horse plasma for anti-venom products. These are being developed for human use, which takes Plasvacc a big step closer to their ultimate goal.

$5 billion potential

Through the ‘Smart State Strategy’, the Government has been aiming to attract investment capital to the biotechnology industry with a view to developing export markets. So far, so good - Ernst & Young’s Queensland Biotechnology Report 2003 showed that business owners expect 39% employment growth and 110% revenue growth over the next 2 years.

At July’s BIO2004, the Biotechnology Industry Organisation's Annual International Convention and Exhibition held in San Francisco, Peter Beattie and Tony McGrady looked even further into the future. Here, in front of the world’s major biotechnology players and big-spending venture capitalists, they released Queensland Bioindustries 1999-2004, a review of the state’s progress, with strategies for the sector's growth.

"We have made a lot of progress in a very short space of time” said Mr Beatty, “but we need to maintain the momentum. If we continue to give the industry a high priority, by 2010 it should be providing $1 billion in revenues annually, directly employing 2,500 people and have gained a $5 billion chunk of the world's biotech market.”