



Victorian Biotechnology Strategic Development Plan 2007 Towards 2010: Year 2 Progress Report

March 2010



www.biotechnology.vic.gov.au



Department of Innovation, Industry and Regional Development

Tel: (+61 3) 9651 9257

biotechnology@diird.vic.gov.au

www.biotechnology.vic.gov.au

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Message from the Premier



A handwritten signature in black ink, appearing to read 'John Brumby'.

John Brumby MP
Premier of Victoria

In Victoria, we are well on our way to achieving our vision of becoming one of the world's top five international biotechnology locations.

The Victorian Government has set out this vision because we understand the potential of biotechnology to deliver solutions to the challenges facing Victoria. Biotechnology can make a major contribution to our quality of life while also building on our existing strengths, to develop an internationally competitive sector in a globalised world where knowledge-based industries increasingly drive growth.

To make the vision a reality, we have made unprecedented investments in science, technology and innovation infrastructure and created a highly competitive business environment to make sure that Victoria remains an attractive location for biotechnology investors and for commercialisation of our world-class research breakthroughs.

We have successfully pursued international alliances to generate new opportunities for our companies and researchers. We have also worked hard to become Australia's leader in providing biotechnology-related education, training and skills development.

These actions are now delivering great results for Victoria. Our biotechnology sector is tackling our biggest health challenges, improving healthcare services, helping to manage and protect the environment, developing healthier foods and exploring new solutions to climate change.

These actions are also great for our economy. A 2009 independent impact assessment showed that Victorian Government investment of more than \$620 million in science, technology and innovation initiatives between 1999 and 2008 has created more than 7,600 full time jobs, delivered around 1,750 new export contracts and added \$1.7 billion to Victoria's Gross State Product.

The success of our approach is also reflected in the resilience of Victoria's biotechnology sector during the recent global economic upheaval. Despite this challenging environment, Victoria's biotechnology sector has kept growing in size, capability and profitability. At the end of 2009, the market capitalisation of our listed biotech companies reached \$23.6 billion, up around 300 per cent on 2001. Victoria now has 13 profitable listed companies – up from just five in 2004 – and our life sciences sector now employs more than 22,000 people.

All of these achievements have been driven by three Biotechnology Strategic Development Plans since 2001. These plans, and the outcomes they have delivered, are based on a partnership between the government, the research community and industry that has secured Victoria's reputation as a leading global location for biotechnology.

As we start developing our fourth Biotechnology Strategic Development Plan, the Victorian Government remains committed to strengthening and advancing this partnership to keep building a mature and successful biotechnology sector that will continue to deliver major economic, health and environmental benefits for all Victorians.

Message from the Minister for Innovation



A stylized handwritten signature in black ink, appearing to read 'Gavin Jennings'.

Gavin Jennings MLC
Minister for Innovation

The second year of the 2007 Biotechnology Strategic Development Plan has seen yet another strong performance from Victoria's biotechnology sector, despite the impact of the global financial crisis.

In 2009 we saw the Australian Regenerative Medicine Institute opened at Monash University's Clayton campus, making Victoria home to one of the world's largest regenerative medicine and stem cell research institutes.

We also announced the new Parkville Comprehensive Cancer Centre, jointly funded by the Victorian Government and Commonwealth Government. The centre will bring together the nation's best cancer researchers, educators and clinicians under one roof, undertaking some of the most cutting-edge cancer research in the world, and giving cancer sufferers access to world-leading advanced care and treatment.

Exciting breakthroughs occurred in the treatment of infectious diseases, breast cancer, neuroscience, malaria and multiple sclerosis. Our international stem cell leadership was reflected in Victorian researchers being the first to receive international funding to collaborate with scientists from the California Institute for Regenerative Medicine.

Victoria remained at the leading edge of influenza research, with firms such as CSL, Biota / GlaxoSmithKline and BioDiem contributing to the global response to the H1N1 influenza. Commercialisation of our research is set for more success, with five new products expected to be filed for market approval in 2009–10.

During 2009, we also entered into our largest ever international agricultural biotechnology research partnership – an alliance with Dow AgroSciences – that will develop new plant varieties to meet the growing global demand for food, livestock feed and energy. We continued our partnership with BASF Plant Science in Germany to deliver one of the most advanced programs in the world for the development of drought-tolerant crops. We continue to promote cross-sectoral collaborations for example, Victorian agricultural researchers announced their discovery of a new compound in milk that could help to combat heart disease and diabetes.

Responding to the needs of industry, we introduced a new streamlined process for reviewing clinical trials. An increasing number of clinical trials are being conducted in Victoria, and this new process will make our state an even more attractive location for testing new treatments.

As we enter the third and final year of the 2007 Biotechnology Strategic Development Plan, the Victorian Government will develop the next Strategic Development Plan, again in close consultation with the biotechnology sector. Then in 2011, we will report on the final outcomes of the 2007 Plan.

This report demonstrates the Victorian Government's strategic leadership and support through the plan, which in conjunction with the skills and commitment of our researchers and biotechnology companies, is driving strong growth for one of the world's leading life science sectors.

As part of the Victorian Biotechnology Strategic Development Plan 2007, Victoria's biotechnology community has been working with the Victorian Government to deliver agreed actions and review the progress of the Plan on an annual basis. This Progress Report reviews the second year of the Plan's operation, from December 2008 to the end of 2009. Further details of investment and achievements in the biotechnology sector, including the review of the first year of the Plan's operation and *Action in Partnership: Building our biotechnology future* (Victorian Biotechnology Strategic Development Plan 2007) are available from the Business Victoria website: www.business.vic.gov.au

Victorian biotechnology: 2009 highlights

Victoria remains on track to become one of the world's leading biotechnology locations. During the second year of the 2007 Biotechnology Strategic Development Plan, Victorian companies recorded major successes in developing new drugs, treatments and products, and securing new overseas markets. New research facilities and international alliances were announced, and Victorian researchers continued to receive international recognition for their work.

Corporate highlights

As of 31 December 2009, Victoria was home to seven life science companies with a market capitalisation greater than \$250 million: CSL, Sigma, Biota, Cellestis, Acrux, Universal Biosensors and ChemGenex. Victorian biotechnology companies continue to lead the world in a number of areas and many recorded major successes in 2009:

- ▶ CSL, Australia's largest biotechnology company is ranked in the top five biotechnology companies by sales, and became one of the first companies to develop and register a swine flu vaccine. CSL also reinforced its position as the world's second biggest maker of blood plasma products in 2009 and reported a \$1.15 billion net profit for the 2008-09 financial year.
- ▶ Biota completed trials on its second generation flu treatment in Japan and is now progressing to market approval for the product. Biota also acquired the assets and programs of two overseas antibacterial drug discovery companies that have highly promising projects underway for drug resistant infections.
- ▶ Geelong based ChemGenex became the first Australian company to submit a cancer drug for approval by US regulators without the help of a large pharmaceutical company. ChemGenex is seeking approval in 2010 for its chronic myeloid leukaemia drug Omapro. CEO and Managing Director Dr Greg Collier was recognised for his outstanding contribution to the advancement of biotechnology in Australia in receiving the AusBiotech 2009 Chairman's Excellence Award for outstanding contribution by an individual within a company.
- ▶ Acrux completed successful trials of its male testosterone replacement drug, Axiron, and will now file for US marketing approval. Acrux was recognised for its excellence within the Australian biotechnology sector, with Dr Richard Treagus, CEO accepting the AusBiotech Roche 2009 Excellence Award for outstanding contribution to the biotechnology industry by a company at the AusBiotech 2009 conference.
- ▶ Starpharma secured an international licensing deal for the development of a VivaGel®-coated condom. The deal is estimated to be worth at least A\$100 million in licence fees and royalty payments. VivaGel® is a gel-based product that prevents the transmission of sexually transmitted diseases.
- ▶ Following outstanding preclinical trial results, Mesoblast will conduct a Phase II global trial using its proprietary adult stem cell technology for the treatment of degenerative intervertebral disc disease. It is estimated that there are four million patients in the US alone with the disease, which is the main cause of chronic lower back pain.
- ▶ HealthLinx obtained approval from European Certification (CE) for OvPlex™, its early stage ovarian cancer test, enabling sales of the test to begin in the United Kingdom and other EU countries.
- ▶ Universal Biosensors co-developed a blood glucose monitoring device with LifeScan, and announced a milestone payment of US\$16 million. The device has been launched in the Netherlands by LifeScan. The strips for the new device will be manufactured by Universal Biosensors at its facility in Rowville, a state-of-the-art plant with annual capacity of up to 750 million biosensor strips.
- ▶ Cellestis had steady growth, with increased revenue of 80 per cent to \$34.5 million in the 2008-09 financial year, led by sales of the company's flagship product: a diagnostic test for latent tuberculosis infection.

Case study

The \$41 million **Victoria's Science Agenda Investment Fund (VSAIF)** is a competitive grants program that began in 2009. The VSAIF supports market focused collaborative projects between business and research organisations. These projects strengthen Victoria's science and technology capabilities and deliver tangible outcomes (for example, products, services and solutions) to improve productivity, sustainability and/or health. The VSAIF provides for projects focused on health, productivity and sustainability. To date, grants have been provided totalling \$14.95 million for health and \$10.38 million for productivity projects, with a further round of sustainability underway.

Projects funded in the health sector will assist Victoria in positioning itself as the location of choice for biotechnology research and ventures. New jobs created through the investment will leverage Victoria's world leadership in the sector, help it grow and reinforce its international competitiveness.

Projects being funded include pharmaceuticals, agricultural biotechnology, health management, diagnostics and therapies.

- ▶ \$1.5 million for a new collaboration to develop next generation pharmaceutical formulations between GlaxoSmithKline and Monash University's Institute of Pharmaceutical Sciences. This technical collaboration represents a unique strategic partnership and is set to increase Victoria's ability to develop and manufacture cutting edge pharmaceutical products. Total project value is \$3.29 million.
- ▶ \$2.035 million for Murray Goulburn Co-operative project to develop a protein found in milk that has the potential to treat chronic muscular and bone diseases. Total project value is \$8.24 million.

- ▶ \$2.95 million to the Australian Tissue Engineering Centre and its project partners to explore a practical and much needed alternative to using silicon in breast reconstructions after a mastectomy. Total project value is \$6.14 million.
- ▶ \$1.025 million for bluechiip to develop an electronic tracking solution for the cryogenic storage of cord blood and stem cells. Total project value is \$2.54 million.
- ▶ \$0.54 million to Centre for Eye Research Australia for trialling a novel laser treatment to halt the progression of early stage age-related macular degeneration. Total project value is \$1.08 million.
- ▶ \$2.9 million to Precedence Health Care for establishing the Australian Collaborative Care Cluster for chronic disease. Total project value is \$7.47 million.
- ▶ \$2 million to Avipep for high-value clinical products for oncology diagnosis and therapy. Total project value is \$5 million.
- ▶ \$0.65 million to Simavita for a new continence management technology system. Total project value is \$2.16 million.
- ▶ \$0.75 million to HealthLinx for an early stage ovarian cancer diagnostic. Total project value is \$2.45 million.
- ▶ \$0.6 million to Florey Neuroscience Institutes for a stroke telemedicine program for rural and regional Victoria. Total project value is \$2.14 million.



Research highlights

Victoria's base of research excellence creates a pipeline of opportunities for local biotechnology firms and for collaborations and investment partnerships with international companies and research organisations. This research base is now of global significance in terms of funding and reputation. The Victorian Government continues to develop this base by providing new research infrastructure and ongoing operational support, and by entering into strategic global alliances and collaborations.

► In May 2009, the Victorian Government and Commonwealth Government announced joint funding for a new \$1 billion cancer centre in Melbourne – the Parkville Comprehensive Cancer Centre (Parkville CCC). The purpose-built centre will drive the next generation of progress in the prevention, detection and treatment of cancer. It will focus on innovation and collaboration in cancer research and treatment, bringing together the nation's best researchers, clinicians and educators, and giving them access to state-of-the-art technologies. The centre will also provide the highest standard of care and treatment for cancer sufferers. The powerful alliance created by the Parkville CCC will accelerate the development of new cancer treatments, leading to earlier detection, innovative therapies, individualised care and – ultimately – an increase in survival rates and quality of life.

► Victoria's position as a leader in agricultural biotechnology was reinforced by the signing of a major global alliance between the Victorian Government and Dow AgroSciences (a subsidiary of The Dow Chemical Company). This alliance will work on developing new plant varieties, improving crop yields and helping farmers to develop innovative solutions to pressures such as climate change.

► Four Victorian and Californian joint research teams were the first to be joint-funded through a new initiative with the US\$3 billion California Institute for Regenerative Medicine (CIRM), known as the Victoria-California Stem Cell Alliance. These links are CIRM's first ever international partnerships, and stem cell researchers from the Florey Neuroscience Institutes, the Australian Stem Cell Centre and Monash University will now collaborate with their Californian partners on four projects worth US\$22.7 million. Each

project supports the early translational research needed to take stem cell science and technologies from the laboratory to the development of safe clinical therapies for patients. These projects – which include work on developing neural stem cells as therapies for Parkinson's and Alzheimer's Disease – will further enhance Victoria's international leadership in stem cell research and neurosciences.

A number of major Victorian medical research discoveries and breakthroughs were reported during 2009:

► **Stem cells** – the identification of a new stem cell behind the most dangerous forms of breast cancer at the Walter and Eliza Hall Institute of Medical Research (WEHI), and the creation of Australia's first induced pluripotent stem cell lines, derived from skin cells, which will enable scientists to study a range of diseases (Monash Institute of Medical Research).

► **Cancer** – the successful trial of a new biomarker-associated therapeutic treatment (PLX4032) for melanoma and colorectal cancer (a collaboration between the Peter MacCallum Cancer Centre, the Royal Melbourne Hospital (Melbourne Health) and Cancer Trials Australia). Victoria was the only trial site outside the US chosen by Plexikon for its first Phase I trial of PLX4032.

► **Infectious disease** – the identification of a critical step in the malaria parasite lifecycle that opens up new possibilities in the development of anti-malarial drugs (Burnet Institute, WEHI and Deakin University).

► **Neuroscience** – the discovery of genes linked to a susceptibility to multiple sclerosis (MS) that may help to identify the causes of MS and other auto-immune diseases (Florey Neuroscience Institutes) and a world-first 'ECG for the mind' diagnostic system, which measures patterns of

electrical activity in the brain's vestibular (or balance) system against distinct response patterns found in depression, schizophrenia and other central nervous system disorders (Monash University).

► **Dairy innovation** – the discovery of a compound in milk that could combat a combination of disorders that increase the risk of cardiovascular disease and diabetes (researchers from Victoria's Department of Primary Industries (DPI) and MG Nutritionals – a division of Murray Goulburn Co-operative Co Ltd).

Several developments in public and preventive health were also reported in 2009, including:

► New research showing that modern medical treatment, including lifestyle changes and the latest drugs, is as effective as surgery at preventing strokes caused by a narrowing of the major neck artery – potentially leading to fewer operations, reduced risks to patients and lower costs (Baker IDI Heart and Diabetes Institute).

► A mental health intervention program that halved the incidence of post-natal depression and anxiety in women with no history of psychiatric problems in the first six months after giving birth, providing promising evidence that the inclusion of fathers and infants in additional small group education programs has sustained benefits (University of Melbourne).

► The commencement of a world-first trial of routine chlamydia testing, targeting all sexually active young people – the largest project of its kind worldwide (University of Melbourne and partners).

► Commencement of the pandemic H1N1 flu vaccine trial, which will involve 400 children across five states in a trial of the vaccine produced by CSL (Murdoch Childrens Research Institute and the University of Melbourne).

Case study

Bionic Eye offers hope to many

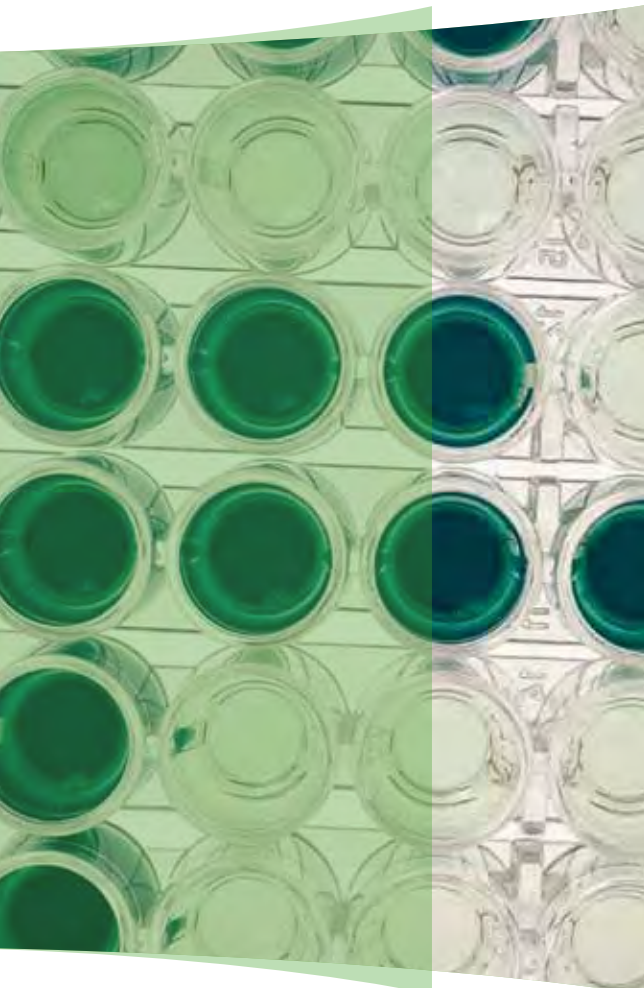
Victoria is leading both successful consortia in Australia's Bionic Eye project, further demonstrating the state's strength in world-class research and innovation, and in bringing together effective collaborations to tackle significant research problems.

The two consortia, Bionic Vision Australia, and Monash University, are collaborations between material scientists, electrical and electronic engineers, ICT, biomedical researchers, behavioural scientists, clinical neurosurgeons and ophthalmologists.

Bionic Vision Australia is a partnership between the University of Melbourne, the University of New South Wales, University of Western Sydney, Australian National University, the Victoria Research Laboratory of National ICT Australia (NICTA) and Melbourne's Bionic Ear Institute and Centre for Eye Research Australia. The Monash-led consortium is a partnership between Monash University, Alfred Hospital and MiniFAB.

Both consortia aim to develop devices to treat the most common forms of adult blindness, including age-related macular degeneration. However, they will use completely different strategies. Bionic Vision Australia aims to develop a high resolution device to be implanted in the rear of the eye, while the Monash University-led consortium aims to develop an implant to stimulate the visual cortex within the brain, bypassing the eye and optic nerve.

In 2009, the Australian Research Council announced a new research initiative to develop a functional bionic eye – a project with the potential to give and restore sight to many people around the world. In December, the Commonwealth Government announced that the two Victorian-led consortia will share in funding of \$50 million allocated to the project.



Achieving our vision

The Victorian Government continues to maintain high levels of support for biotechnology. The government has set ambitious targets for the sector, invested heavily in research infrastructure and developed a series of Biotechnology Strategic Development Plans to achieve its vision of Victoria becoming one of the world's top five locations for biotechnology.

For almost a decade, the Victorian Government has maintained its commitment to the sector, recognising the potential of biotechnology to deliver solutions to the challenges facing Victoria. This commitment has included the provision of major new research infrastructure and technology platforms, the expansion of existing facilities and ongoing funding for the activities of Victoria's leading research institutes. The government has also taken action to improve the skills of the Victorian workforce in biotechnology-related areas, attract and retain talented researchers, and provide backing for closer collaboration between biotechnology companies and researchers.

The three-year strategic plans implemented by the government have had a major influence on the growth and sustainability of the sector. These plans have provided substantial public investment in the sector, strengthened Victoria's capabilities in key areas, and fostered closer connections between government, industry associations, companies and researchers.

The **2001 Plan** put in place the fundamentals needed to build a successful biotechnology sector, including strengthening Victoria's research and development (R&D) foundations and facilitating industry growth through new start-up companies, R&D partnerships and

clinical trials. The plan's targets were achieved two years ahead of schedule.

The **2004 Plan** focused on filling infrastructure gaps in the discovery-to-market pipeline and building international alliances and partnerships. The plan's targets were achieved, including a substantial increase in R&D expenditure across the biotechnology sector and more than \$4 billion worth of deals signed by Victorian companies and research organisations.

The **2007 Plan** focuses on building a mature, flourishing and commercially sustainable sector by 2010. For the first time, this plan establishes a strategic partnership between government, industry associations, companies, researchers and the finance community. This partnership endorsed a vision for the biotechnology sector:

By 2010, we will aim to ensure that Victoria has mature, sustainable and flourishing biotechnology companies characterised by commercial success, a commitment to skills development, a willingness and capacity to reinvest in the sector and strong public support.



Implementing the Plan

The partnership established under the 2007 Plan identified four areas where action needed to be taken to achieve the vision for the biotechnology sector's future, grow the sector and meet agreed targets by 2010:

Action Area 1: **Creating a competitive business environment**

Action Area 2: **Building a bioeconomy**

Action Area 3: **Making Victoria a preferred place to live, work and learn**

Action Area 4: **Delivering access to high quality infrastructure**

Victoria's biotechnology community has been working together in each of these action areas following the pathways set out in the strategic plan framework below. This approach has provided positive results – developing new ideas and initiatives, providing advice and advocacy on behalf of the sector, and actively supporting the government's efforts to drive growth across the sector.

Action Areas	Outcomes	Agreed Vision	2010 Targets
Creating a competitive business environment	1. Appropriate regulatory frameworks	2010 Mature, sustainable and flourishing companies, commercial success, commitment to skills development, strong public support	10 firms with market cap of \$250 million
Building a bioeconomy	2. Improved access to investment capital		\$1 billion of capital raised
Preferred place to live, work & learn	3. Integrated sectors		Two major cross-sector initiatives
Access to infrastructure	4. Responses to climate change		Five new international projects facilitated
	5. Skilled workforce		Victorian Biomarker System established
	6. Public support		
	7. Competitive infrastructure		
	8. Access to infrastructure		

Pathways

Effective communication	Commit to research excellence	Build trust and confidence	Attract, develop and retain people	Greater collaboration and partnership	Boost transformative capacity	Forge global connections
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Achieving our vision

The 2007 Plan also set five targets for the sector. Meeting these targets will ensure that Victoria achieves the plan's overall goal of building a mature, flourishing and commercially successful sector by 2010. The government will report against these targets early in 2011; however, two targets have already been achieved and others are on track to be met by the end of 2010. Strong indicators of the success of the plan to date include:

- ▶ Despite the global financial crisis and the most difficult fund-raising period in recent times, the sector (including CSL) raised more than \$1.98 billion in the 2008-09 financial year.
- ▶ As of 31 December 2009, seven Victorian firms now have a market capitalisation greater than \$250 million (CSL, Sigma, Biota, Cellestis, Acrux, Universal Biosensors, and ChemGenex) and four firms have a market capitalisation between \$100 million and \$250 million (Mesoblast, Starpharma Holdings, Probiotec and Avexa).
- ▶ 11 new international projects have been facilitated, including two projects under an MoU with Manitoba, four projects through the Victoria-California Stem Cell Alliance, three projects funded through the Victoria-Israel Science and Technology R&D Fund (VISTECH), and the global research alliance between Victoria and Dow AgroSciences.
- ▶ Two major cross-sectoral biotechnology initiatives have commenced:
 - Australia's first business innovation research program, Smart SMEs Market Validation Program (MVP), has provided an opportunity for Victorian biotechnology firms to develop a cutting-edge Methane Biodigester System. This system could have extensive commercial applications by providing more environmentally effective dairy effluent management.
 - The Victorian Government through Victoria's Science Agenda Investment Fund has provided support for clinical development of a newly discovered low abundance bioactive milk protein with demonstrated nutraceutical and pharmaceutical commercialisation potential. The protein was discovered in an agricultural

biotechnology research program conducted by Murray Goulburn Co-Operative Co. Ltd (MGC) and the Victorian Department of Primary Industries (DPI), and is expected to have a number of benefits and applications in the biomedical area. The protein, known as Regeneration Inducing Peptide for Tissues and Cells (RIPTAC), has significant potential for the prevention and treatment of chronic muscular and bone diseases in the elderly.

- ▶ A Victorian Biomarker Pilot Project was established in 2009. This \$763,000 pilot, also co-funded with the Victorian Cancer Agency, aims to develop a more accurate and earlier test for bowel cancer and interrogate the route to market for biomarkers in Victoria.



Sector performance

Victoria's life science sector continues to perform well, growing in size, strength, capability and profitability.

Compared to many other locations, Victoria's biotechnology sector has survived the global financial crisis (GFC), maintaining a strong base of profitable firms. The maturity of the sector is reflected in a tripling in market capitalisation since 2002, with increasing investment in R&D and the prospect of five new medicines to be filed for international marketing approval in 2009-10.

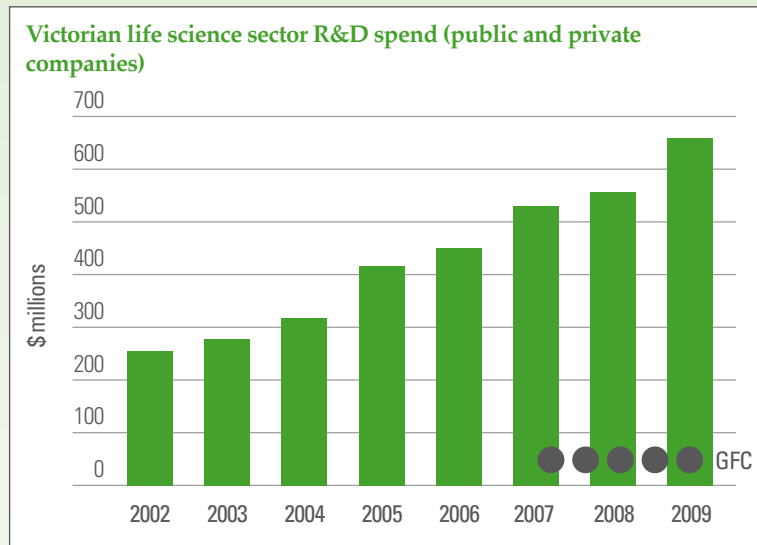
The state's world-class medical research base also continues to expand, with Victorian medical research institutes almost tripling their income since 2000.

The sector has matured and now includes a growing number of sustainable and profitable firms. In the first half of 2009, there were 13 profitable listed life science companies based in Victoria, up from five in 2005.

R&D expenditure growing

Victorian biotechnology companies continue to increase their investment in R&D – one sign of a mature, confident sector.

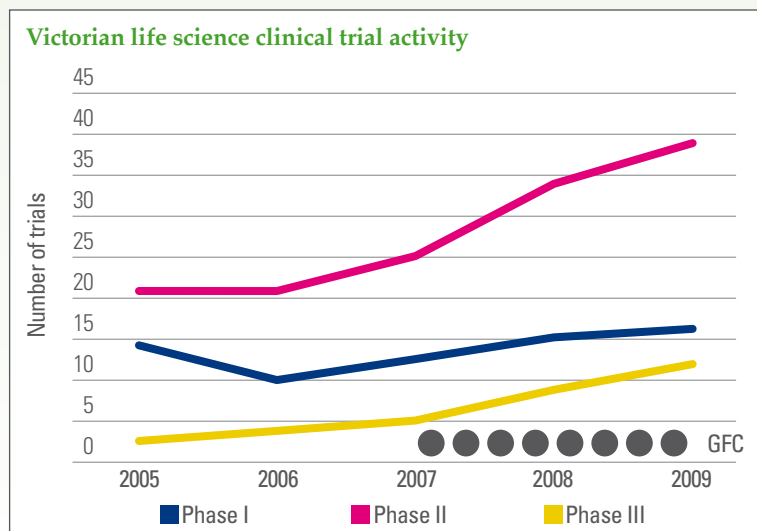
Corporate R&D expenditure totalled \$653 million at June 2009, an increase of almost 150 per cent since June 2002.



Source: Blake Industry and Market Analysis P/L

Development activity rising

Clinical trial activity of Victorian biotechnology companies continues to rise, with 12 Phase III programs underway at October 2009 (compared to three in 2005) and 39 Phase II programs underway (compared to 21 in 2005).



Source: Blake Industry and Market Analysis P/L

Achieving our vision

Sector profitability up

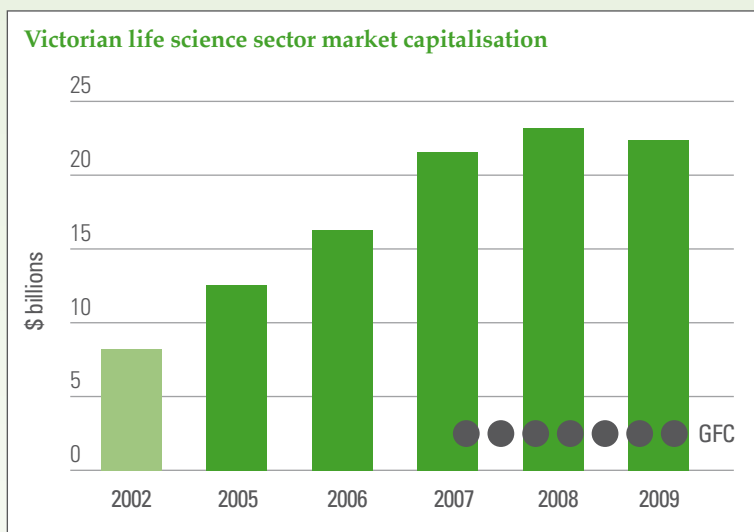
The sector has matured and now includes a growing number of sustainable and profitable firms. In the first half of 2009, there were 13 profitable listed life science companies based in Victoria, up from five in 2005.



Source: Blake Industry and Market Analysis P/L

A resilient sector

Victoria's biotechnology sector has demonstrated remarkable resilience in a challenging global environment. The market capitalisation of Victoria's listed life science companies has almost tripled since 2001 and at 31 December 2009 was \$23.6 billion.

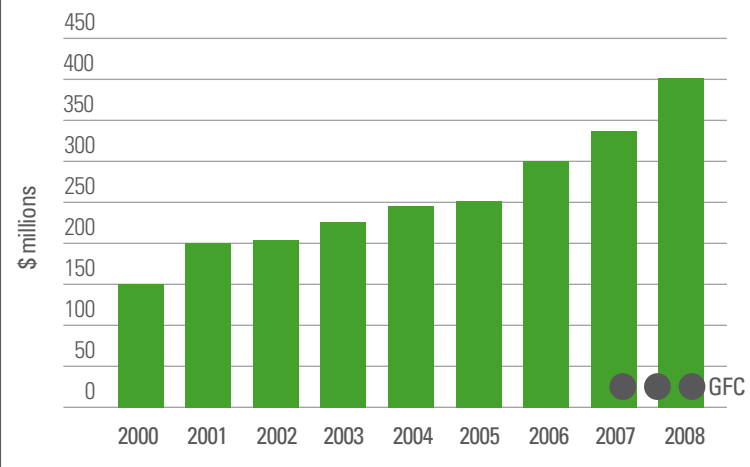


Source: Blake Industry and Market Analysis P/L (2005-2009) and Deloitte Biotech Index (2002 and 2001)

Medical research base expanding

Victoria's medical research institutes have nearly tripled their income over the past eight years – from \$148 million in 2000 to more than \$400 million in 2008. The strength of the state's medical research base is reflected in Victoria maintaining a higher than 40 per cent share of national research funding grants, despite growing interstate competition.

Total grants to Victorian medical research institutes

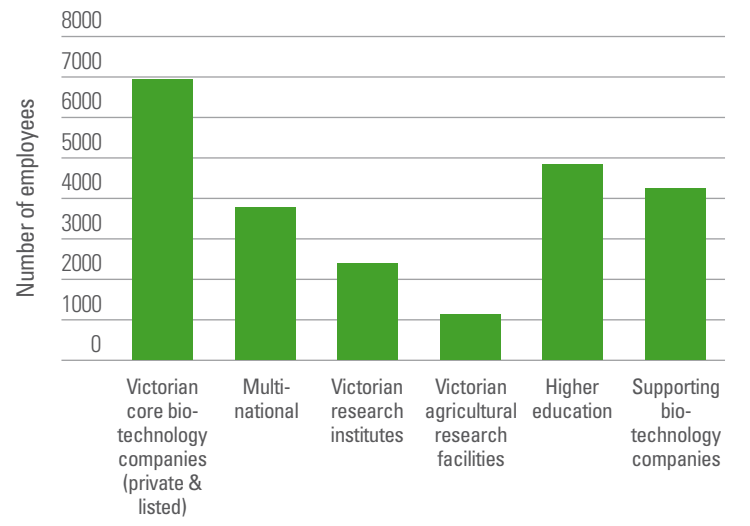


Source: DIIRD Operational Infrastructure Support Program

Diverse employment across the sector

In 2009, Victoria's life science sector employs more than 22,000 people. Since 2004, employment in Victoria's core biotechnology companies (both private and listed) has risen by over 65 per cent and there is now a more diverse range of jobs across the sector: from research institutes to core biotechnology companies and higher education.

Employees in Victorian life science sector in 2009



Source: Blake Industry and Market Analysis P/L

Action Area 1

Creating a competitive business environment

Victoria offers a highly competitive business environment for innovative industries and leads Australia in reducing the regulatory burden on businesses. Further action was taken during the second year of the 2007 Plan to secure Victoria's reputation as an attractive location for biotechnology, including a new streamlined approvals process for clinical trials and new initiatives to assist Victorian companies gain access to potential investors.

Appropriate regulatory frameworks

Victoria leads Australia in delivering regulatory reform to create a more competitive economy. The Victorian Government's *Reducing the Regulatory Burden* initiative aims to achieve a 25 per cent reduction in the administrative burden of regulation on businesses over five years. In 2008-09, this burden was reduced by an estimated \$243 million, making Victoria an even more attractive investment location.

In November 2009, Victoria's **new streamlined process for the ethical review of multi-site clinical trials** commenced operation. More information on this initiative is

available at www.health.vic.gov.au/ethics/multi/. Under the new system, researchers need only apply for one approval for a multi-site trial instead of obtaining separate approvals for each site. Central Human Research Ethics Committees will review and approve multi-site trials, with the aim of making decisions within 30 working days.

This new system will mean that clinical trials can begin more quickly, making potentially lifesaving treatments available to Victorians much sooner. It will reinforce Victoria's position as the premier location for clinical trials in the Asia Pacific region, with a high quality health system, a competitive regulatory environment and fast regulatory processes, as well as high standards of ethical review and patient safety. These

qualities will provide a strong incentive for international industry and researchers to conduct research in Victoria, as well as enhancing our reputation as a developer of pharmaceutical solutions to global health problems.

Improved access to investment capital

The Victorian Government continues to assist the biotechnology sector in gaining access to investment capital. During 2009, the government supported several opportunities for Victorian companies to raise their international profiles, present their products in the global marketplace and meet with new investors, including sending delegations to the BIO 2009 convention in Atlanta and the Bangalore Bio conference in India.

In October 2009, Melbourne hosted the **inaugural Australasian Life Science Investment Summit**, which showcased R&D from Australian biotechnology companies, and highlighted the high calibre of investment potential in Australia to representatives of biotechnology, investment and pharmaceutical firms from around the world. More than 100 investors from 90 institutions attended the summit including venture capitalists, fund

Public investment in science and technology delivers value for money

New independent research shows that the Victorian Government's investment in science and technology has created thousands of jobs and generated major economic benefits.*

An assessment of Victoria's *Science, Technology and Innovation* (STI) initiative by Deloitte Australia found that the program contributed up to \$3.55 to Victoria's economy for every dollar invested by the government.

More than \$620 million in government investment between 1999 and 2008 has delivered:

- 1750 new export contracts
- 375 patents
- The arrival in Victoria of more than 500 elite researchers from interstate and overseas
- More than 1274 discoveries requiring patent protection
- 97 exclusive and 604 non-exclusive multiple licensing agreements.
- 2400 industry / research collaborations

The projected economic benefits of this investment are:

- \$1.7 billion to GSP
- \$1.2 billion in additional funds and co-investments
- \$815 million on real private consumption
- 7,610 full time jobs.

These results demonstrate that Victoria's investment in these areas is delivering strong economic returns for the community.

* *Impact Assessment of the Science, Technology and Innovation Initiative, Deloitte Australia, October 2009*

managers, investment bankers, 'angel' investors and representatives of superannuation funds and the venture capital arms of major pharmaceutical and biotechnology companies from Australia, the Asia Pacific region, North America and Europe. Thirty-eight companies presented at the summit, including early-stage companies and listed companies with products in late-stage development.

Two pilot programs were introduced to assist companies to establish international alliances and gain access to capital:

► The **Biotechnology International Partnering Program** recognises the unique needs of the biotechnology sector and the importance to the sector of developing global partnerships, alliances and licensing deals. Launched in October 2009, this pilot program assists Victorian biotechnology companies to attend overseas conferences and trade events, with the aim of developing international partnerships in biotechnology.

► Launched in February 2009, the \$28 million **Smart SMEs Market Validation Program (MVP)** is a highly innovative program that will help

Victorian companies develop and commercialise new technology-related products and services. Under the program, Victorian public sector entities identify particular challenges and then engage SMEs to explore the feasibility of developing technology solutions to these challenges. The proposed 'solution' must involve new technology, such as biotechnology, nanotechnology or environmental technologies. The program includes access to R&D grant funding over four years for SMEs and is designed to boost the ability of SMEs to commercially prove their products, develop their R&D capability and build a viable base from which to secure expansion capital, export revenue and future customers.

The Methane Biodigester System is one project supported by the program that has the potential to be of considerable value to the Victorian biotechnology sector. The Department of Primary Industries is seeking to identify and validate innovative and more environmentally effective dairy effluent management systems that will enable medium and large scale dairy operations to produce a substantial amount of their own electricity.

The project aims to develop a comprehensive effluent treatment system that includes a primary stage anaerobic bio-digester for biogas (methane) production and a secondary stage micro-algae cultivation pond (which may be harvested for use as animal feed, fertiliser or bio-fuels). This project offers an opportunity for Victorian biotechnology firms to develop a cutting-edge system or product that could have extensive commercial application.

Victoria also continues to deliver highly successful programs to support the commercialisation of technologies – programs that have facilitated access to over \$248 million in public and private investment since 1990. During 2009, the Victorian Government worked with the Competitive Business Environment Working Group to deliver a **submission to the Commonwealth Government on the new Commercialisation Australia initiative**. A copy of the submission can be found at www.diird.vic.gov.au/commercialisationaustralia/ Further information on Commercialisation Australia can be found at www.commercialisationaustralia.gov.au



Action Area 2

Building a bioeconomy

Victoria continues to make the transformation into a forward-looking, leading bioeconomy – an economy that applies bioscience discoveries and developments to solve challenges in health, agriculture, industry and environmental sustainability. Initiatives undertaken during the second year of the 2007 Plan will place Victoria at the forefront of global agricultural and industrial biotechnology, including a new Dairy Futures Cooperative Research Centre in Bundoora and a major new international R&D alliance.

Integrated industry sectors

Victoria's biotechnology sector, backed by the Victorian Government, supports the integration of the dairy, livestock, grain and medical research sectors by identifying biotechnology solutions to common problems and exploring collaborative opportunities to use biotechnology as a tool for new agricultural processes and products.

In August 2009, Victoria's new \$128 million **Dairy Futures Cooperative Research Centre** in Bundoora received support funding, and is expected to be

operational by early 2010. The centre brings Australian dairy research together in one location and includes 16 partners from industry, research organisations and government. The centre will boost research into improved dairy farming practices, increase opportunities for collaboration between researchers and industry, and provide better returns on research investment. In the medium-term, the centre's research program is expected to generate over \$300 million in benefits for the Australian dairy industry.

Research conducted at the centre will help to develop more productive

pastures for the dairy and grazing industries, improve the selective breeding of cattle, reduce methane production and improve the efficient processing of milk. New pasture varieties and farming systems developed by the centre will assist the dairy industry to adapt to climate change and reduce its environmental impacts.

Locating the centre in Melbourne reinforces Victoria's leadership in dairy bioscience and keeps Victoria at the forefront of new discoveries and development in dairy research. The Victorian Government is investing



\$40 million in the centre, with a further \$28 million coming from the Commonwealth Government and the remainder from industry. The centre is part of Victoria's *Future Farming* strategy, which aims to boost farm productivity through the use of technology and changes in farming practices.

The Victorian Government supported the **development of Victoria's medical devices sector** through projects implemented by the Victorian Medical Device Network (VicMDN). With a government funded industry development officer, VicMDN was able to improve the content and functionality of the Medical Device Business Directory; lead inbound and outbound business missions (including attendance at MEDICA, the key annual industry meeting in Germany); and support the introduction of industry-relevant tertiary skills courses for the medical devices sector.

In industrial biotechnology, new investment, export and partnership opportunities were explored by the

Victorian Clean Technology Industry Capability Mission to California in May 2009. Led by the Minister for Innovation, Gavin Jennings, the mission showcased Victorian expertise in technologies such as carbon emissions reduction tools, renewable energy, green buildings, and water and waste management. The mission, a direct outcome of the 2007 MoU signed between Victoria and California to collaborate on climate change action, was highly successful. Seven companies that participated in the mission are in the process of developing or expanding their US operations, leading to an expected \$18 million increase in exports over the next 24 months.

The Victorian Government jointly sponsored an **Industrial Biotechnology Workshop** with Deakin University in August 2009. Industrial biotechnology is the application of biotechnology for industrial purposes, such as manufacturing and alternative energy (or bioenergy), and includes the practice of using cells or components of cells to generate industrially useful products. The workshop brought together a

group of more than 30 stakeholders to discuss and explore ways to develop industrial biotechnology in Victoria. Workshop topics included improving research infrastructure, developing sustainability in manufacturing, assessing landscapes for biomass and promoting industry-research sector links. A major outcome of the workshop was a draft action plan identifying core actions and targets that will support a successful, industry-driven approach for industrial biotechnology.

The Victorian Government through Victoria's Science Agenda Investment Fund has provided support for clinical development of a newly discovered low abundance bioactive milk protein with demonstrated nutraceutical and pharmaceutical commercialisation potential. The protein was discovered in an agricultural biotechnology research program conducted by Murray Goulburn Co-Operative Co. Ltd (MGC) and Victorian Department of Primary Industries (DPI), and is expected to have a number of benefits and applications in the biomedical area.



Action Area 2

Building a bioeconomy

The clinical development program will be conducted by a consortium that leverages clinical and biomedical research infrastructure, expertise and capabilities in Victoria, as well as cash funding from the Victorian dairy industry. The protein, known as Regeneration Inducing Peptide for Tissues and Cells (RIPTAC), has significant potential for the prevention and treatment of chronic muscular and bone diseases in the elderly.

The production of RIPTAC will add significant value to what is currently a by-product stream of dairy manufacturing. The value proposition for Victoria is that raw materials sourced from Victorian dairy farmers will be transformed into biologic nutraceutical and pharmaceutical products for improving health outcomes.

Biotechnology solutions to climate change

Victoria is particularly vulnerable to both the physical impacts of climate change and the eventual introduction of a carbon price. The Victorian Government has been at the forefront of Australia's efforts to address climate change and is exploring opportunities to use biotechnology to help Victoria to adapt to the impacts of climate change, get the most out of the state's extensive renewable energy resources and make the transition to a low carbon economy.

Developing new plant varieties that are resistant to the impacts of climate change and that improve crop yields will be critical to the future of Victorian agriculture. A new **global alliance between the Victorian Government and Dow AgroSciences** will greatly strengthen Victoria's research leadership in these areas.

The alliance – the largest international agricultural biotechnology partnership ever undertaken by the Victorian Government – establishes an R&D

collaboration between DPI and Dow AgroSciences (a subsidiary of the Dow Chemical Company). This collaboration will share technologies and scientific expertise to develop new plant varieties and traits to meet the growing global demand for food, livestock feed and energy. Crops targeted by the alliance will include canola, corn and wheat, as well as bioenergy crops.

Victoria is hosting the **first Australian field trials of high-energy pasture grasses** developed by scientists at DPI and the Molecular Plant Breeding Cooperative Research Centre (MPBCRC). These grasses are more digestible for cattle and sheep, potentially allowing farmers to reduce the amount of feed they require for their stock – a significant breakthrough for industries that have less pasture available due to climate change and drought.

The MPBCRC also began the second year of **field trials on drought tolerant and fungal resistant GM wheat** through a \$28 million collaborative R&D program with BASF Plant Science



(Germany). This seven-year drought-tolerant wheat project is one of the most advanced in the world and produced Australia's first field trial of drought-tolerant GM wheat plants, following regulatory approval received from the Office of the Gene Technology Regulator. Preliminary results indicate yields of the GM wheat are up to 20 per cent higher than non-GM wheat under drought stress.

Case study

New \$230 million AgriBio centre for Victoria

AgriBio – Victoria's new biosciences research centre – is taking shape in Melbourne's North Biotechnology Precinct and is set to put Victoria at the forefront of global agricultural research.

Located at La Trobe University's Bundoora campus, the centre will bring together up to 400 biosciences researchers and staff from DPI and La Trobe University, including scientists, students and support workers.

AgriBio will be a world class centre for agricultural biosciences R&D, specialising in plant and animal genomics, plant pathology, animal health and agricultural sustainability. The centre will focus on cutting-edge research to protect and improve the productivity of Victoria's agricultural sector. It will play a leading role in the rapid detection and eradication of plant and animal disease outbreaks, and in helping Australia's farming sector to meet climate change, environmental and other challenges.

By offering state-of-the-art facilities and well-established Victorian expertise in biosciences, the centre will attract leading scientists from around the world, foster collaboration across scientific disciplines to provide solutions to industry problems and enable the sharing of technology, equipment and facilities required for advanced R&D.

In May 2009, the Premier of Victoria John Brumby announced that the Plenary Research consortium (consisting of the Plenary Group, Grocon and Honeywell Services), had won the tender to design, construct, finance and provide facility management services for AgriBio. Construction started in May, with the centre expected to be fully operational in 2012.



Victoria's AgriBio Centre

Action Area 3

Making Victoria a preferred place to live, work and learn

As well as maintaining a highly competitive business environment, the Victorian Government is taking action to ensure that Victoria is an attractive place for the world's leading researchers and for the highly skilled workers required by the biotechnology sector. The government also continues to develop and support education, training and careers initiatives to encourage young Victorians to consider careers in biotechnology.

Skilled workforce

A skilled workforce is essential to the ongoing growth and success of Victoria's biotechnology sector. Through the 2007 Plan and other strategies and initiatives, the Victorian Government is supporting and building a skilled workforce in the biotechnology sector and other innovative and emerging industries.

To identify where government and industry efforts should be directed, the Victorian Government commissioned a **Biotechnology Skills and Workforce Review**. The review will be completed in early 2010 and will provide policy

recommendations to government to ensure that Victoria continues to support highly skilled workers in the growing biotechnology sector.

The government is providing \$316 million to create more than 170,000 new training places as part of the new **Securing Jobs for Your Future – Skills for Victoria** program of skills reforms. As well as providing many more training places, Victoria's new skills system allows public and private training providers to offer subsidised training and gives providers much greater flexibility to respond to market demand for skills. Biotechnology firms will be able to take advantage of the

much broader range of training choices available and the new system's emphasis on supporting the industries and jobs of the future. To ensure that Victorian biotechnology firms gain the maximum benefits from these skills reforms, the government is developing a **Skills Engagement Industry Action Plan** for the sector.

Since 2003, the Victorian Government has supported the **Undergraduate Research Opportunities Program (UROP)** administered by the Bio21 Cluster. UROP has made a significant contribution to Victoria's biosciences workforce by providing over 260 science graduates with practical research experience, the vast majority of whom have moved on to further study or employment in the biomedical research sector. UROP also assists in the development of cross-disciplinary research skills in areas such as bioinformatics, biostatistics, computer-aided drug design, medical bionics and biomedical engineering.

In July 2009, the Bio21 cluster announced that CSL will provide



Professor Elizabeth Blackburn

sponsorship of \$50,000 a year for the program over the next three years supporting the program in conjunction with the Victorian Government.

Following a successful trial in 2008, the **Science and Technology Education Leveraging Relevance (STELR) program** was rolled out to 30 Victorian schools. STELR is a secondary school program that uses renewable energy technology to stimulate students' interest in science and technology, and to encourage students to appreciate that physics, chemistry, biology and mathematics are highly relevant to their future lives. STELR also aims to increase the number of students choosing science and engineering careers.

With advice and assistance from the Skills and Public Support Working Group, and following the success of the inaugural event, the government sponsored a second **Careers Expo at the AusBiotech 2009 Conference** held in Melbourne in October 2009. This free event aimed to alert tertiary students to the diversity of career opportunities in the biotechnology industry. A panel of

Victorian biotechnology leaders inspired students' interest in the sector by speaking about their own career pathways and achievements.

During the year, the Victorian biotechnology community worked with the government to develop new opportunities for building skills within the existing workforce. A **new Mergers and Acquisitions Course** run by AusBiotech with support from the government attracted 30 industry participants, including senior executives of biotechnology companies, with an interest in learning more about the legal, taxation and other implications of mergers and acquisitions.

A number of Victoria's leading researchers were also awarded **2009 Victorian Neurotrauma Initiative Neurotrauma Fellowships**, which are designed to support researchers who show great potential in their early careers. Three-year Fellowships (worth more than \$325,000) were awarded to: Dr Nicole Bye of the Alfred Hospital's National Trauma Research Institute to

investigate how to promote the growth of new nerve cells after traumatic brain injury; Dr Edwin Yan, also of the National Trauma Research Institute, to investigate biochemical brain responses following traumatic brain injury; and Dr Cheryl Soo of the Murdoch Childrens Research Institute to adapt an established treatment for young people with a traumatic brain injury.

Victorian researchers also benefited from funding awards through the Clinical Research Fellowships, provided by the Victorian Cancer Agency. The **Victorian Cancer Agency Clinical Research Fellowships** are aimed at strengthening and supporting clinical cancer research. These grants aim to increase the pool of both clinician-researchers and allied health researchers working directly on clinical problems. The Fellowships program provided total funding of over \$2 million to four researchers in 2009.



Action Area 3

Making Victoria a preferred place to live, work and learn

Public support

The 2007 Plan recognises the importance of maintaining strong public support for biotechnology. Through the plan, Victoria's biotechnology community is creating new opportunities to inform the public about developments in biotechnology and engage Victorians in discussion about the economic, health and environmental benefits being generated by scientific and medical research.

The government sponsors a number of awards designed to support scientific research and innovation, recognise outstanding achievements by Victorian researchers and inform the public about scientific discoveries and breakthroughs.

► The prestigious **Victoria Prize** is awarded annually by the Victorian Government to an individual for exceptional achievement in science, engineering or innovation, including biotechnology. In 2009, the Victoria Prize was awarded to Professor Murray Esler in recognition of his internationally

renowned contributions to cardiovascular neuroscience.

Professor Esler is a clinical cardiologist and medical scientist whose discoveries have changed the practice of medicine and led to new ways of treating heart failure, stress and high blood pressure. Professor Esler leads the Baker IDI Heart and Diabetes Institute's research into the relationship between the brain and heart health, and is also Professor of Medicine at Monash University.

► The **2009 Premier's Award for Public Health and Research** was awarded to Dr Kylie Mason of WEHI for her world-acclaimed work in hematology. Dr Mason has discovered that by adding a new class of anti-cancer drugs to standard chemotherapy, it is possible to eradicate a highly resistant blood cancer in mice. Human clinical trials will begin soon at the Royal Melbourne Hospital to confirm her discovery.

► The government also continues to support the **Alfred Deakin Innovation**

Lectures, which aim to engage the community in discussion about new developments and ideas in science, technology and innovation. Curated by Professor Chris Ryan, the 2009 lecture series focused on the theme of *Climate Change and Innovation* and explored new ways to build Victoria's low carbon economy. The series featured a lecture on *The Photon Economy* by Dr David Mills, the inaugural 2009 VESKI Entrepreneur in Residence.

► The **Australian Synchrotron** conducted another successful **Open Day in 2009**, welcoming over 2,000 visitors to the facility on Sunday 25 October. Visitors with some specialised knowledge could select from a comprehensive range of specialised tours featuring accelerator physics, mechanical engineering, electrical engineering, IT and controls, and safety systems. Visitors were also able to conduct their own self-guided tours that covered the basics of synchrotron science and its real-world applications.

International and national recognition for Victoria's research leaders

Victorian researchers received international recognition for their leadership during 2009:

- Professor Suzanne Cory from WEHI was named a Knight of the Legion of Honour, France's highest honour, for her services in promoting collaborations between France and Australia in science, education and culture. Professor Cory was also awarded the 2009 Curtin Medal for Medical Research for her outstanding contribution to medical science.
- Dr Jeanne Tie of the Ludwig Colon Cancer Initiative Biomarker Laboratory received the Bradley Stuart Beller Merit Award from the American Society for Oncology.
- Two researchers from Melbourne's Prince Henry's Institute – Professors Evan Simpson and Peter Fuller received medals from the UK Society for Endocrinology for their international contributions to hormone research.

A number of researchers received national recognition for their work:

- Professors Joe Trapani and Mark Smyth from Melbourne's Peter MacCallum Cancer Centre received the GlaxoSmithKline Award for Research Excellence for their breakthrough research proving the link between the immune system and cancer.
- WEHI researcher Dr Marnie Blewitt was awarded one of three 2009 L'Oreal Australia Women in Science Fellowships for her work on epigenetics.
- Professor Garry Jennings, Director of the Baker IDI Heart and Diabetes Institute, was the 2009 joint winner of the Heart Foundation Research Medal for Lifetime Contribution to Cardiovascular Research.
- Professor Melissa Wake of the Royal Children's Hospital's Centre for Community Child Health received the 2009 Federal Health Minister's Award for Excellence in Health and Medical Research for her landmark work to solve common child health problems.
- WEHI Professor Len Harrison's research into a vaccine for type 1 diabetes was one of the National Health and Medical Research Council's *10 Best Research Projects 2009*.

The Victorian Government continued its support for a range of public events that engage the broader public in the science underpinning biotechnology development in the state. **Research Australia's annual 'Thank You Day'** public awareness campaign aims to raise community awareness of the benefits of health and medical research through a national public engagement program. The highlight event of the campaign was held in Melbourne in November 2009 and recognised the work of the health and medical research community, as well as philanthropists, advocates and corporations who support medical research.

The **Victorian Government Leadership and Innovation Award** was awarded to Professor Joseph Sambrook in 2009. This award recognises an individual or organisation that has shown exceptional leadership and innovation towards making health and medical research a higher national priority. Professor Sambrook is a Distinguished Fellow at the Peter MacCallum Cancer Centre and

Executive Scientific Director of the Stem Cell Centre at Monash University.

Other public engagement programs supported by the Victorian Government include **Free Range Science**, which is run by the Royal Society and aims to engage Victoria's regional community in biotechnology-related sciences in everyday life. The 2009 series included the 'Cheesy tasty science treats' event, which was held at the Ararat farmer's market and presented a Sensory Chemist from Deakin University who explained the biotechnology processes involved in the making and eating of cheese to the local community.

Support continued for **National Science Week** for a range of biotechnology-related public programs, including the Underground Science talk series. This series was aimed at 18-35 year olds and provided expert discussion panels on a range of biotechnology-related topics, such as neuroscience.

The work of the **Australian Science Media Centre** continued to receive support. The centre provides

journalists with information and expert scientific points of contact to help inform public debate on a variety of current biotechnology-related media issues. In 2009 this included information relating to the Hendra Virus outbreak, the mapping of the horse genome, swine flu, xeno-transplantation, gene patenting, and salt tolerant crops.

The strong and growing international reputation of Victoria's biotechnology sector and medical research institutes means that many of Victoria's leading scientists who are based overseas continue to maintain links with their home state. For example, Professor Elizabeth Blackburn, who won the 2009 Nobel Prize for Physiology or Medicine, carries out most of her work overseas but maintains close links with WEHI in Melbourne and is the Louis Matheson Distinguished Visiting Professor at Monash University. Professor Blackburn spends at least one month each year carrying out research and teaching in Melbourne.



Dr Kylie Mason



Professor Murray Esler

Action Area 4

Delivering access to high quality infrastructure

Victoria continues to build a world class infrastructure base for biotechnology, focusing on areas of existing expertise and capability. Major new facilities in regenerative medicine, neuroscience, cancer and infectious diseases place Victoria among the leading locations in the world for research in these fields. Improved industry access to public infrastructure – and closer collaboration between industry and researchers – is leading to exciting discoveries and breakthroughs, and new medical treatments, products and services.

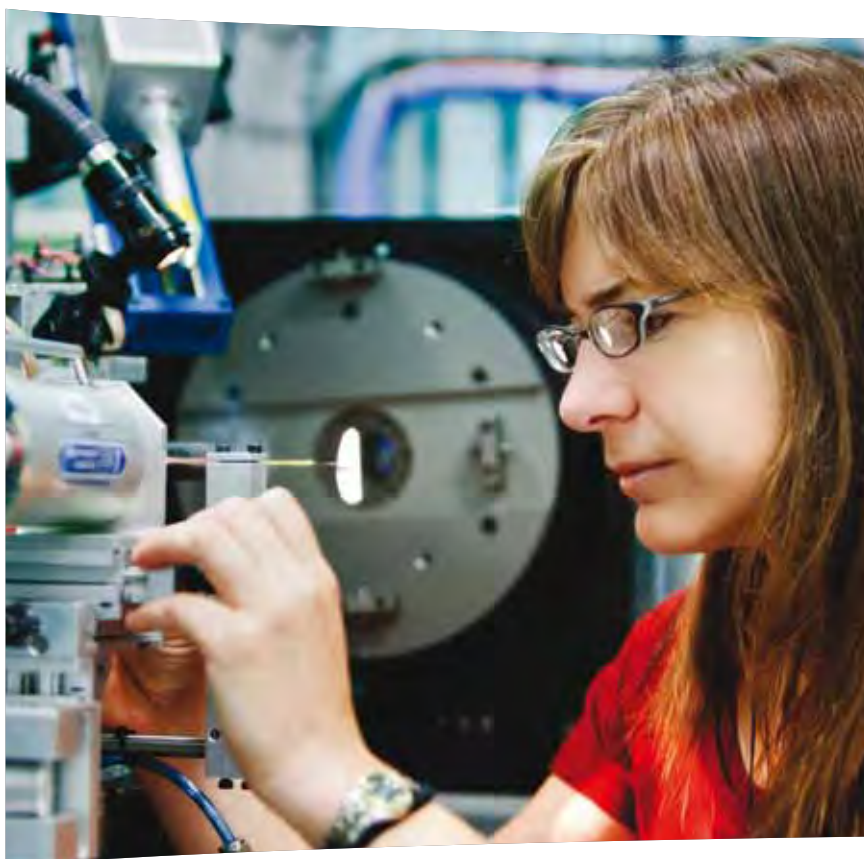
Internationally competitive infrastructure

The government continues to work with the biotechnology sector and the Commonwealth Government to develop major infrastructure projects under the *Healthy Futures* life sciences statement and the National Collaborative Research Infrastructure Strategy (NCRIS). Many of these projects are now moving from the planning and development phase into the construction and operational phases.

► One of the world's largest regenerative medicine and stem cell research institutes, the **Australian Regenerative Medicine Institute (ARMI)**, opened at Monash University's Clayton campus in April 2009. Established through a joint venture between the Victorian Government and Monash University, the \$153 million institute will explore the basic mechanisms of the regenerative process, enabling doctors to prevent, halt and even reverse damage to vital organs due to disease, injury or genetic conditions. ARMI's new building houses state-of-the-art research platforms, including a Gene Recombineering Facility (for genetic manipulation technologies),

Transgenic Services and FishCore (the southern hemisphere's largest zebrafish facility, which is working with genetically modified and mutant strains of zebrafish that model a variety of human diseases and conditions). ARMI's work will form the basis of treatments for conditions such as neurodegenerative disorders, diabetes, arthritis, and muscular-skeletal and cardiovascular diseases.

► Construction commenced on the \$150 million **expansion of the Walter and Eliza Hall Institute (WEHI)**, which will give WEHI the additional facilities it needs to operate large and diverse research teams, pursue new areas of research, keep up with international



developments and attract and retain talented researchers.

► Construction also commenced on the new Austin Neuroscience Facility, the first stage of the \$225 million **Australian Centre for Neuroscience and Mental Health Research**. The centre will bring together the Florey Neuroscience Institutes (an amalgamation of the Howard Florey Institute, the Brain Research Institute and the National Stroke Research Institute) with the Mental Health Research Institute and neuroscientists from the University of Melbourne. When operational, the centre will be one of the top 10 neuroscience institutes in the world.

► Progress continued on delivering new facilities for the **Burnet Institute**, which merged in 2006 with the Austin Research Institute to create the largest infectious diseases institute in the southern hemisphere. The new facilities will be completed early in 2010.

► Construction was completed in September 2009 on the **Bioresources Facility at Austin Health**, with \$9.2 million funding provided by the Victorian Government under the *Healthy Futures* initiative. This facility

includes new animal facilities at the Austin Hospital campus for researchers from Austin Health, the University of Melbourne and the Ludwig Institute for Cancer Research – Melbourne Centre.

► Development of \$100 million **Victorian Life Sciences Computation Initiative (VLSCI)** continued in 2009. The VLSCI successfully completed the Stage 0 computational research program and is on track to install the Stage 1 supercomputer in early 2010, providing computational services to Victorian life science researchers.

► The **Victorian Node Recombinant Protein Feeder Facility** at Monash University was officially opened in December 2009. This \$11.2 million facility is headquartered at Monash University's ARC Special Research Centre for Green Chemistry with additional research capability provided by CSIRO's Division of Molecular and Health Technologies. The three facility partners provide Victorian industries and researchers with cost-effective access to physical infrastructure and capability in the field of advanced bio-product manufacture.



Action Area 4

Delivering access to high quality infrastructure

Access to public infrastructure

The Victorian Government continues to promote closer links and greater collaboration between industry and the research community in using public infrastructure, and continues to explore ways to improve industry access to this infrastructure.

Closer connections and collaborations between industry and researchers will maximise the benefits from Victoria's investment in public infrastructure. One important initiative to improve industry and researcher links is the development of the **Victorian BioPortal**, a web-based access point designed to highlight Victoria's biotechnology capability and direct users to the facilities, services and expertise available to support biotechnology firms and researchers.

The BioPortal will act as a central point for information exchange between local, national and international biotechnology firms, investors and researchers, as well as a source of current and accurate information about Victoria's biotechnology sector for researchers, students, the public and media. The portal is strongly supported by industry and has been developed with the assistance of the Skills and Public Support Working Group and the Infrastructure Working Group. The BioPortal will be fully operational in 2010.

Platform technologies, such as high-throughput chemical screening, bioresources, informatics and protein crystallisation, are critical components of research infrastructure. Following substantial investment in recent years, a wide range of platform technologies are

now available in Victoria. To improve awareness of and access to existing platform technologies – and encourage greater collaboration between industry and researchers in using these technologies – the government has established the **Victorian Platform Technologies Network (VPTN)**.

The VPTN will comprise a number of 'nodes' of platform technologies across the state beginning with nodes at the Bio21 Cluster and Monash University. The network will include the development of a comprehensive map of the technologies available at each node, continually updated information about each platform and shared activities, such as workshops and skills development programs. Access to the technologies in each node will be promoted through the BioPortal.

Breakthroughs and discoveries at the Australian Synchrotron

In its first year of operation since 'first light', the Australian Synchrotron in Melbourne is already producing exciting results for medical, scientific and industry researchers.

- Malaria researchers achieved a major breakthrough in the treatment of the disease by using the synchrotron to map the structure of a key digestive enzyme that the malaria parasite needs to feed and sustain itself in the human bloodstream. This important discovery will be used to develop more sophisticated anti-malaria drugs and to combat the growing problem of drug-resistant malaria.
- Researchers used the synchrotron to solve the structure of a crucial protein that affects the immune system and cancer cells, a discovery that may assist in improving experimental anti-cancer drugs.
- The synchrotron's X-ray fluorescence microscopy beamline was critical to the development of a 'super vegetable', Booster Broccoli, a currently available non-GM product that provides at least 40 per cent more antioxidants than existing stock. The broccoli is

expected to be the first in a range of boosted varieties of vegetable, such as carrot and corn, which could help people who do not eat enough vegetables to get more nutritional value from fewer servings.

The research capability of the synchrotron received a further boost in April 2009 with the announcement of a new imaging and therapy beamline that will make the Australian Synchrotron one of only three facilities in the world using synchrotron technology for the treatment of cancer. \$1.5 million funding provided by the Victorian Government will contribute to the building extension that will house the equipment for the beamline.

Scientists will use the beamline for microbeam radiotherapy (MRT), which allows cancer radiation treatment to be more accurately targeted to prevent damage to healthy cells surrounding a tumour. The beamline will also be used to investigate heart disease and diabetes, and for faster and more accurate research into conditions such as cystic fibrosis, multiple sclerosis and osteoporosis.

New biomarkers project

Commencing in July 2009, the Biomarkers Pilot Project aims to develop a more accurate and earlier test for bowel cancer. The project highlights the importance of collaboration in accessing public infrastructure, as well as demonstrating the value of previous Victorian Government investment in research infrastructure and platform technologies.

The \$763,000 project is further co-funded by the Victorian Cancer Agency, and is a collaboration between Cancer Trials Australia, the Ludwig Institute for Cancer Research – Melbourne Centre, the Peter MacCallum Cancer Centre and the Victorian Cancer Biobank. Biomarkers are any biological characteristic that can be used as an indicator of disease or response to treatment. The project will examine the use of protein and DNA biomarkers in the treatment of bowel cancer to identify roadblocks for Victorian researchers and companies validating biomarker diagnostics.

The project builds on Victoria's well-established capacity and track record in biomarker discovery and brings together clinicians who diagnose and treat bowel cancer patients with scientists researching the biomarkers of the disease. They will use research infrastructure, including the Victorian Cancer Biobank and the Monash Antibody Technologies Facility, to develop a more sensitive and reliable screening test to detect bowel cancer in its earliest stages when treatment is likely to be most effective.

With more than 4,000 Australians dying each year from bowel cancer, this project has the potential to save many lives.

All four organisations involved in the pilot project have previously combined with the Royal Melbourne Hospital and US company Plexxikon to successfully trial a new biomarker-associated treatment for melanoma and bowel cancer. This trial also relied upon research infrastructure developed with Victorian Government funding, including the BioGrid and the Victorian Cancer Biobank. Melanoma patients from the Peter MacCallum Cancer Centre and Royal Melbourne Hospital with a particularly deadly form of cancer have had a nearly 100 per cent response rate to the new treatment, with most showing over 30 per cent reduction in tumour size.



Photography acknowledgements

Cover: Left – Department of Primary Industries, Right – Australian Regenerative Medicine Institute, Monash University; Page 1: Australian Stem Cell Centre; Page 5: Left – Peter MacCallum Cancer Centre, Right – GlaxoSmithKline; Page 7: Left and Right – Australian Regenerative Medicine Institute, Monash University; Page 8: Left – Ludwig Institute for Cancer Research – Melbourne Centre, Right – GlaxoSmithKline; Page 10: Left – Department of Innovation, Industry and Regional Development, Right – Cancer Trials Australia; Page 15: Left and Right – Ausbiotech 2009 (Courtesy of Ray Messner Photography); Page 16/17: Left, Middle and Right – Department of Primary Industries; Page 18/19: Left – Department of Primary Industries, Middle – Regional Development Victoria, Right – AgrioBio Centre; Page 20/21: Left – Box Hill TAFE, Middle – Professor Elizabeth Blackburn (Courtesy of UCSF), Right – Department of Innovation, Industry and Regional Development; Page 23: Left – Dr Kylie Mason, Walter and Eliza Hall Institute of Medical Research, Right – Professor Murray Esler; Page 24/25: Left – Australian Synchrotron, Middle – Australian Regenerative Medicine Institute, Monash University, Right – Australian Synchrotron; Page 27: Left and Right – Australian Synchrotron.

