Review of activities

Associate Professor Stephen Adkins and PhD student Gemma Hoyle work on Seeds for Life UQ, the State’s first seed bank. This is part of the international Millennium Seed Bank Project initiated by the Royal Botanic Gardens Kew, UK, to collect the seeds of 24,000 native plants from around the world.
Research and research training

We sought new knowledge in a broad range of disciplines and trained a new, enterprising generation of researchers. Outcomes included discoveries of global significance and pre-eminence in competitive funding rounds – confirming our standing as a leading Australian research institution.

Assessing performance

Benchmarking and review
To maintain our premier status in an increasingly-competitive international environment, we evaluate our research performance against that of our peers in Australia and overseas.

We review progress against research targets, monitor performance (our own and that of our main competitors) in peak national funding rounds, and benchmark our activities through membership of Universitas 21 and the Group of Eight (pages 4, 5).

These activities inform our research management practices aided by regular school and centre reviews chaired by national or international experts. We follow up recommendations 12 and 18 months post-review. This year, we reviewed our:

- School of Health and Rehabilitation Sciences;
- National Research Centre for Environmental Toxicology;
- School of Integrative Biology;
- School of History, Philosophy, Religion and Classics;
- School of Social Science;
- Centre for Microscopy and Microanalysis; and
- School of Law.

Competitive funding

Staying in front
Our research performance, according to well-accepted quantitative indicators, continued its upward trend.

Our total reported research income in 2003 (latest data available) was $154.7 million – a 13 percent rise on the previous year and a 73 percent increase on the result achieved five years prior in 1998. We also recorded a significant increase in our income from Australian competitive grants schemes, which totalled $63.4 million (31 percent more than in 2003).

In the 2004 Commonwealth Block Grants we ranked third nationally for:

- Institutional Grants Scheme funding ($28.9 million, or 10.2 percent of the national total);
- Research Infrastructure Block Grant earnings ($15.4 million, 9.6 percent); and
- Research Training Scheme earnings ($52.1 million, 9.6 percent).

Preliminary figures show continuing growth for 2005 in our Block Grant Schemes earnings.

ARC funding
We received more than $32 million in Australian Research Council (ARC) funding announced in 2004 for Discovery and Linkage Projects starting in 2005. This places us among the top five universities in Australia (with the Universities of Melbourne, Sydney and New South Wales, and the Australian National University). Together, these attract more than half the available funds.

We reaffirmed our leadership in terms of industry interactions, topping the nation’s institutions for funding from the first round of ARC 2005 Linkage Projects announced in 2004. These encourage long-term strategic alliances between university researchers and collaborating partner organisations.

We received about $7.2 million in Linkage grants (worth $18.1 million when matched with $10.9 million in industry partner contributions), well ahead of the University of New South Wales with $4.9 million and the University of Melbourne with $4.3 million.

Our major grants included:

- $600,000 from the ARC plus $1.2 million cash and significant in-kind support from Pioneer Hi-Bred International Inc and the Queensland Department of Primary Industries – to research and model the genetics and physiology of key adaptive traits in sorghum and maize (School of Land and Food Sciences);
- $297,000 from the ARC plus $110,000 cash from Queensland Rail and...
Established research strengths*...

- Australian and postcolonial studies
- cognition, performance and human interaction
- cultural, historical and media studies
- governance and citizenship
- institutional and organisational change
- social and economic disadvantage
- aetiology and management of disease
- population health and health promotion
- biotechnology
- cellular and molecular bioscience
- complex and intelligent systems
- environment, biodiversity and sustainability
- food and health
- hypersonics
- imaging science and technology
- marine studies
- materials and nanotechnology
- neuroscience
- sustainable agricultural production systems
* reflecting areas for which we are known internationally, generate significant external income, and have first-rate records for graduate supervision

Queensland Transport – to research strategies for handling urban sprawl and congestion in south-east Queensland (School of Geography, Planning and Architecture); and
- $922,011 from the ARC and industry partners MAIC (QLD), Suncorp General Insurance and Centeno Clinic – to validate biological and psychological prognostic indicators of outcome following whiplash injury (School of Health and Rehabilitation Sciences).

We secured 88 grants worth more than $25 million in the ARC Discovery Projects grants round announced in 2004. Funding included:
- $1.1 million to study colour vision and photoreceptors in reef fish (Vision, Touch and Hearing Research Centre);
- $965,000 to research systematic design standards for microdevice manufacture (School of Engineering); and
- $675,000 for work on optically-driven micromachines and microtols (School of Physical Sciences).

We received $4.85 million for three projects (of 24 awarded nationally) to establish ARC Research Networks in:
- Enterprise Information Infrastructure: $1.6 million (School of Information Technology and Electrical Engineering);
- Spatially Integrated Social Science: $1.5 million (School of Geography, Planning and Architecture); and
- Cultural Research: $1.75 million (Centre for Critical and Cultural Studies).

Health research funding
We received Queensland’s largest (and the nation’s fourth-largest) share of National Health and Medical Research Council (NHMRC) Project Grants, winning more than $15 million for 35 projects. This was $1 million more than our previous year’s total and included:
- $716,250 to study seizures in newborn babies (Obstetrics and Gynaecology); and
- $656,250 to look at relationships between production of white blood cells and cancer progression (Institute for Molecular Bioscience – IMB).

Ours was one of just three institutions nationally to win inaugural NHMRC Health Services Research Grants, with the first funding round focusing on economics and financing of health. Our School of Population Health received $3.2 million for a project looking at ways to reduce health costs and health inequalities, and to improve the health of Australians.

We attracted $23 million under the NHMRC Program Grants scheme. We will lead two programs and contribute to two others, as part of the 20 grants awarded nationally. Our grants included:
- $4.7 million to develop therapies using the human immune system to treat disease (led by our Centre for Immunology and Cancer Research);
- $7.1 million to use marine snail toxins to improve understanding of chronic pain (led by our IMB);
- $4.3 million to study the molecular genetics of sex determination and gonad development (involving IMB); and
- $7.07 million for a multi-skilled team of researchers to investigate diabetes, heart and kidney disease in Indigenous Australians (involving our School of Medicine).

The IMB was one of just three recipients of the largest research grant ever allocated by the Australian Cancer Research Foundation (ACRF).

The ACRF gave $3.3 million to the IMB, the Garvan Institute in Sydney and the Peter MacCallum Cancer Centre in Melbourne. IMB will use the $1.2 million funding to establish a state-of-the-art Dynamic Imaging Facility for Cancer Biology, a unique facility in Australia enabling the pursuit of cutting-edge approaches to experimental imaging of cells, tissues and whole organisms.

National fellowship profile
We maintained a high profile for elite national fellowships, placing second in Australia after the Australian National University (ANU) for 2004 Federation Fellowships. Our University won five of 25 awarded nationally.

Federation Fellows are regarded as among the best in the world in their fields. Of this year’s winners, two are already based at our University and three are world-class international researchers. Their expertise range from principles of quantum information science and self-organisation in biomolecular systems to biohumanities.

During 2003 and 2004 our scientists won three Smart State Fellowships, for work investigating:
IMB scientist Dr Norelle Daly uses a nuclear magnetic resonance spectrometer to research the molecular structure of retrocyclin, a molecule with the ability to protect human cells from HIV infection.

Emerging research strengths...

- drama, diversity, peace and conflict resolution (arts, humanities and social sciences)
- on-line health and education, clinical neuropsychology, tissue inflammation and repair (health and medical sciences)
- e-commerce and cyber-law, isotope analysis, trace element chemistry and geochronology (science and technology)

- a drug to block the growth of fat cells;
- why some materials fail during the computer chip manufacturing process; and
- new pest control techniques, based on finding how plant proteins block the digestive enzymes of insect pests.

The Queensland Government provides $150,000 for each fellowship as part of its Smart State initiative and this is matched collectively by research organisations and industry co-sponsors.

Other distinguished awards to University staff this year included:

- three Australian Research Fellowships,
- one Australian Professorial Fellowship and eight Australian Postdoctoral Fellowships (fellowship categories of ARC Discovery Grants);
- 50 Australian Postgraduate Awards Industry PhD Scholarships; and
- NHMRC Research Fellowships worth almost $3 million.

Working with industry

In 2003 (latest data available), we received more than $50 million from industry and other private sources. This confirms the relevance of our research to industry.

We also have one of the highest levels of participation of any Australian institution in the Federal Government’s Cooperative Research Centres (CRC) Program.

In funding announced in 2004, we shared resources totalling $267.64 million under this program. We will be a core or supporting partner in nine of the 16 CRCs awarded, valued at a total $407 million nationally.

We will be a core partner in the new CRC for Contamination Assessment and Remediation of the Environment ($30 million to develop a risk-based approach leading to cost-effective solutions); and core partner in five centres developing from existing CRCs:

- Australasian Invasive Animal CRC ($29.64 million to focus on solving invasive animal pest problems);
- CAST CRC ($33.5 million to provide competitive advantage to Australia’s light metal industry);
- Cotton Catchment Communities CRC ($26.5 million to create economic prosperity integrated with the sustainable use of natural resources);
- CRC for Beef Genetic Technologies ($30 million to improve capacity to deliver high-quality beef to Australia’s global markets); and
- CRC for Polymers ($32 million to develop technically-advanced polymeric materials and polymer engineering to transform Australian industries).

We will be a supporting partner in three additional CRCs and are involved in a successful supplementary funding application.
Outcomes

Publications
Publication in learned journals, books and conference papers communicates the results of our non-commercial research to the international community.

Our research output consistently ranks as one of the highest in the country. The Commonwealth Department of Education, Science and Training (DEST) publications point score for our University increased by 15 percent between 2002 and 2003 (latest figures available).

Highlights this year included the following.
- Researchers from our School of Education and School of Health and Rehabilitation Sciences developed a 45-minute instructional DVD titled Being responsive: you and your child with autism.
- Our Centre for Online Health launched the world’s first known book on telepediatrics, based on a research project that has seen more than 2000 consultations by a “virtual doctor” to children in regional and rural Queensland.
- A population health researcher published a study showing that smoking killed nearly five million people worldwide, causing one in five deaths in Eastern Europe and North America.
- An art history academic published the first known survey of dress around the world today, dispelling the myth of universal “world” attire.
- A contemporary studies academic published a history and social analysis of the pulp fiction phenomenon in Australia.

World firsts
Pioneering research by an IMB scientist on the role of “junk” DNA in genetic programming and regulation was dubbed one of the top 10 discoveries in 2004 by world-leading journal Science. Other premier research findings by our academics and students included:
- discovering the link between a vital cell-signalling pathway and stem cells of the skin, with potential value for treating burns patients (IMB);
- matching mud samples on earth with samples from a meteorite from Mars – supporting the theory that life once existed on Mars (Centre for Microscopy and Microanalysis);
- discovering a molecule that blocks regrowth of damaged nerve processes, of vital importance in developing potential therapies for people with head and spinal injuries (Queensland Brain Institute);
- devising a way to measure single particles of light, or photons, enabling investigations of behaviour in the quantum world – the path of a single photon can now be measured without destroying the photon in the process (School of Physical Sciences); and
- developing the world’s first known spam firewall. The new software analyses email as a whole picture rather than filtering based on components such as keywords or phrases, as happens with other anti-spam software (School of Information Technology and Electrical Engineering).

Finding answers
Other exceptional research outcomes this year included:
- XeroCoat, an anti-reflective, anti-fogging and scratch-resistant coating for glass with application possibilities ranging from bathroom mirrors and swim goggles to spectacles, computer screens and solar cells (School of Physical Sciences);
- the first known implantation in Australia of a microchip heart monitor into a dog (School of Veterinary Science);
- a computer program, eXtensible Multi-Dimensional Simulator (XMDS), which significantly reduces the development time for mathematical simulations from about a week to as few as 10 minutes (School of Physical Sciences);
- an experimental test rig to recreate rail corrugations – part of a project to build software to predict and prevent dangerous corrugations on railway lines (School of Engineering, collaborating with Queensland Rail, RailCorp, the Australian Rail Track Corporation and the Cooperative Research Centre for Railway Engineering and Technologies); and
- definition of factors that increase prosperity for Queensland’s small country towns (UQ Business School).

International collaborations
As headquarters for the Coral Reef Targeted Research and Capacity Building for Management Project, we attracted to Australia one of the world’s largest international projects on coral reefs and climate change. We will manage the project and work with organisations including the Global Environment Facility, the World...
REVIEW OF ACTIVITIES

RESEARCH AND RESEARCH TRAINING

Bank, the Queensland Government, the National Oceanic and Atmospheric Administration (USA), the Inter-governmental Oceanographic Commission of UNESCO, and more than 50 internationally-recognised research institutions.

Other partnerships included the following.

– Australian and US defence interests signed a $4.6 million contract with our HyShot team and ANU to conduct scramjet experiments at Mach 10 (11,000km/hour) in 2005. Flights will also be run at Mach 8 for British aerospace company QinetiQ and Japanese Aerospace Exploration Agency JAXA.

– Environmental engineers helped locate a groundwater source beneath a desert in China, thus explaining why sand dunes there remain stationary despite high wind and severe dryness. Reported in Nature, the groundwater source may now help solve extensive water shortage issues in the region.

– Kangaroo researchers helped prevent decimation of the Mongolian gazelle.

– Japanese electricity industry agencies committed to second-stage funding for a joint project with UQ Gatton investigating use of a by-product from the burning of coal to fix Australia’s soil sodicity and salinity problems and mitigate greenhouse emissions.

– A University of Queensland researcher was one of only three non-French archaeologists (in a team of 30 people) selected for a French Government-funded study in the South Pacific.

– Our researchers collaborated with scientists from the Planetary Sciences Institute, USA to initiate a research program using aeolian landforms in the McMurdo Dry Valleys, Antarctica as an Earth analogue for those seen on Mars.

– Our researchers collaborated with Dr Craig Venter, the US scientist who helped crack the human genetic code, during his six-month visit to Queensland with a Venter Institute team conducting a yacht-based world-wide marine genetic data survey.

– Veterinary science researchers led an international team studying whale song.

– Our UQ Business School worked with two New Zealand universities to launch a trans-Tasman management development program for telecommunications companies.
The University of Queensland Annual Report 2004

Guy Wallis and Dr Jennifer Tichon from the School of Human Movement Studies develop a virtual reality training package for 9000 New South Wales rail staff, aimed at improving stress and crisis management.

REVIEW OF ACTIVITIES

RESEARCH AND RESEARCH TRAINING

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National priorities

Many of our research initiatives, including those previously mentioned, aligned with the four National Research Priorities.

For example, projects focused on **Promoting and maintaining good health** included:

- developing a drug to combat obesity at a cellular level (Centre for Diabetes and Endocrine Research);
- testing safety training for 9000 New South Wales rail staff to improve stress and crisis management (human movement studies);
- identifying ways to boost services for cancer patients (UQ Business School);
- producing policy and practice guidelines for joint cases involving child protection and mental health service workers (School of Social Work and Applied Human Sciences and School of Psychology, working with Queensland Department of Child Safety); and
- developing a computer program to improve diagnosis of Asperger’s syndrome (School of Psychology).

Research aimed at **Safeguarding Australia** included:

- designing “intelligent” car numberplate and sign-recognition software, enabling car numberplates to be scanned like barcodes 24 hours a day (Intelligent Real-Time Imaging and Sensing Group, Information Technology); and
- developing a way to produce truly random numbers from random cosmic rays, to enhance computer code security (Mathematics and Physics).

Initiatives contributing to **An environmentally-sustainable Australia** included:

- developing technology to help return to the ground most of the 45 million tonnes per year of CO₂ emitted from Queensland’s coal-fired power generating plants, potentially adding $25 billion to Queensland’s economy (Faculty of EPSA);
- developing a technique for tracing pollution and long-term changes to coral reef environments (Faculty of BACS); and
- using satellite technology to track koalas (Faculty of EPSA).

Work to develop **Frontier technologies for building and transforming Australian industries** included:

- assessing bananas as an alternative energy source for North Queensland (School of Engineering); and
- developing AM-SCI, an alloy answering a global car industry call for lighter engines (CRC for Cast Metals Manufacturing).

**Commercialising IP**

**Commercial returns**

We identify and support opportunities to commercialise University-owned intellectual property (IP) through research contracts, licence agreements and spin-off companies.

This year, Historico Research Services, the commercial arm of our Centre for Applied History and Heritage Studies, undertook six projects worth about $29,000 for private sector clients. Tasks ranged from historical research for transport impact studies to assessment of military ordnance, analysis of historical archaeology at an excavation in South Brisbane, and a commissioned history of UniQuest Pty Ltd (pages 45-46, 61) to mark the company’s 20th anniversary.

Our Faculty of Arts made its first patent application, relating to technology for conducting language lessons on mobile phones. The system is based on linguistics research in the School of English, Media Studies and Art History, and will use 3G mobile telephony to teach English.

Researchers from our Key Centre for Human Factors and Applied Cognitive...
Psychology trialled Cogniscreen, a computer-based test for Alzheimer’s disease, in a bid to make a simple, sensitive and inexpensive test commercially available by 2006. Telstra Broadband Fund supported the tests.

UniQuest
www.uniquest.com.au

Our main technology transfer company, UniQuest Pty Ltd (pages 10, 61), was identified as representing best practice for Australian university commercialisation, in a 2004 report by Allen Consulting Group for the Australian Vice-Chancellors’ Committee and the Business Council of Australia.

UniQuest organises intellectual property protection, licenses technologies, creates spinoff companies and attracts investment. It also exports our expertise by assembling teams for international development programs (page 61) and facilitating consultancy, testing and R&D services.

In its 20th year of operations, UniQuest generated billings of $39.8 million, of which $17.9 million represented payments or provisions for payments to the University – and made a net profit of $3.5 million. It also helped its spinoff companies raise $35.9 million in investments and $2.95 million in grants, of which a significant proportion flow back into the University as research funding, licensing fees and equity in shares.

UniQuest received 154 intellectual property disclosures, filed 91 patent applications, issued 30 new licenses and contracted 39 major research and development projects. The company also established or helped form six start-up companies, which have obtained external funding and begun commercialising University technologies:

- Dendright Pty Ltd, Herdvac Pty Ltd, and Neurotide Pty Ltd (page 42);
- Xerocoat Pty Ltd (page 42);
- Hydrexia Pty Ltd, research into the use of magnesium compounds for storing hydrogen; and
- Symbiosis Group Limited, to invest in various existing and future University technologies. By the end of 2004, Symbiosis had raised an initial $5.6 million for such investments.

Other highlights included the following.

- We undertook a transaction with public company Koala Corporation Australia (which raised more than $4 million from investors for this project) to develop and commercialise nuclear magnetic resonance imaging technology.
- Spin Systems (Qld) Pty Ltd, a UniQuest spin-off company from the Centre for Magnetic Resonance (CMR), acquired the CMR product development and manufacturing assets and operations from the University. CMR staff engaged in those operations also transferred their employment to Spin Systems. Spin Systems secured capital of more than $1 million – primarily from its major customer, Bruker BioSpin MRI GmbH – to back growth plans for its manufacturing business.
- UniQuest worked with its start-up company Fultec Pty Ltd (commercialising a surge-blocking device to protect telecommunication interfaces) to raise substantial investment from top-tier US venture capital firms.
- UniQuest opened a branch of its International Projects division in Canberra, close to key clients such as AusAID.
- We jointly appointed a Manager for Innovation and Commercial Development for the University’s Australian Institute for Bio Engineering and Nanotechnology (AIBN) and Queensland Brain Institute.
- In the first commercialisation agreement of its kind, UniQuest is collaborating with the University of Wollongong (UOW) to coordinate commercialisation of research and development outcomes from UOW. As part of the agreement, UOW has employed its own Managers of Innovation and Commercial Development.
- We expanded UniQuest’s Faculty Business System to seven centres and schools. These facilitate consulting and research contracts with outside parties using a structured system conforming to business practices and University policies.

This year’s UniQuest innovation competition, Trailblazer (sponsored by Fisher Adams Kelly Patent Attorneys and Davies Collison Cave Patent Attorneys), attracted 86 entries from staff and students. A total of $40,000 in prizes was awarded for ideas or research with commercial potential, including:
- a smart microphone system to record clear signals in noisy environments;
- DNA delivery for the treatment of eye disease;
an entrepreneurial training program for young people at risk; and
an advanced engine optimisation control system for tuning vehicle engines during travel.

Stand-out success
Recognition for the calibre and commercial relevance of our research included presentation of:
the Rising Star award, one of seven 2004 Premier of Queensland’s SMART Awards, to GroundProbe Pty Ltd (formed by Faculty of EPSA staff and students) for technology used worldwide to boost safety in open-cut mines; and
the Australian Museum Eureka Prize for Industry to Plantic Technologies Limited (formed by The University of Queensland, Swinburne University of Technology and CSIRO) for a biodegradable packaging product.

Grants for start-ups
Six UniQuest start-up companies received 2004 Federal Government Biotechnology Innovation Fund grants:
Dendright Pty Ltd ($250,000 to commercialise the use of dendritic cell vaccines in treating auto-immune diseases);
HerdVac Pty Ltd ($232,100 to research a salmonella vaccine for cattle);
Neurotide Pty Ltd ($250,000 to develop a compound for pain relief);
Origio Biotech Pty Ltd ($250,000 to test a plant architectural gene in ornamental flowers);
Impedimed ($250,000 to produce a multi-frequency BIA cardiography medical device); and
QRxPharma Pty Ltd ($250,000 to commercialise use of the agent Q8008 as a therapy for reducing blood loss, and to study other possible medical uses).
QRxPharma partnered with the University to secure an ARC Linkage Discovery grant (page 39) worth $4.6 million over three years. This includes cash plus direct and indirect contributions by all parties, and potentially enables the Venomics group to identify every protein in the venom of Australian snakes.
Three UniQuest start-up companies received Queensland Government Innovation Start Up Scheme grants of $80,000:
Hydrexia Pty Ltd: hydrogen storage technology based on magnesium alloys;
VasCam Pty Ltd: device and method to grow replacement blood vessels; and
XeroCoat Pty Ltd (page 42).

The Queensland Government invested $250,000 in Promics Pty Limited, a UniQuest/IBM company, through the BioStart program. This consortium, led by GBS Ventures and Start-Up Australia, also invested a further $2.75 million in Promics to continue development of new drugs.

Seeding promising projects
www.uniseed.com
Uniseed is an early-stage seed venture capital investment fund commercialising intellectual property at the Universities of Queensland and Melbourne. It was established in 2000 by UQ Holdings Pty Ltd (page 10) and Melbourne University Private.
Over the past four years, Uniseed has committed $9.7 million to 18 companies, with $8.2 million paid to date. About half of this investment is in companies originating from our University and its related organisations.
In 2004, private venture capital funds, government grants and co-investors provided more than $7.9 million, including second-round private-venture funding for two of the fund’s earliest investments. Since inception, Uniseed has also secured $42 million of external capital via leveraging – representing an extra $4.30 investment in ventures for every $1 the fund has committed. Much of this total investment will flow back to the universities through targeted research contracts.
Uniseed has six active investments originating in Queensland: Adipogen; Thrombostat; QRxPharma; Wedgetail; Fultec; and Combinomics. QRxPharma also has operations in Boston, USA. This year, Fultec relocated to the USA after raising US venture capital; Wedgetail merged with US-based Vintela Inc; and Combinomics signed a licensing agreement with Sydney-based Nucleics Pty Ltd.
IMBcom
www.imbcom.com.au
IMBcom Pty Ltd (page 10) commercialises high-value applications arising from research conducted at Australia’s largest bioscience research organisation, our Institute for Molecular Bioscience (IMB).
In 2004, IMBcom helped secure $4,38
million in funding to support research programs with commercial potential. It protected intellectual property by filing four provisional patent applications for various new technologies including algal hydrogen production for clean energy, stem-cell markers and anti-cancer compounds. It also progressed three other patents to the Patent Cooperation Treaty (PCT) system or international patents, and finalised five national phase patents.

During the past four years, IMBcom has helped create and retain equity in 11 startup companies (total capital investment $50 million). Ongoing involvements include Board representation and assistance with commercialisation activities. This year, IMBcom established another two startup companies.

The RRC Company Pty Limited, a trustee company for Nephrogenix, holds equity in Nephrogenix for the drivers, inventors, IMBcom and Monash Commercial. ElaCor Pty Limited will commercialise the discovery of a group of natriuretic peptides isolated from Taiping venom.

Biotechnology Innovation Fund grants of $250,000 each went to ElaCor (IMBcom/UQ/Baker Heart Research Foundation) and Nephrogenix (IMBcom/UQ/Monash University/Renal Regeneration Consortium). These will fund commercialisation activities and renal stem cell research respectively.

IMBcom’s annual BioBusiness program for IMB postgraduates (and, for the first time, AIBN students) featured speakers from Merck, the Magic Pudding Company and Uniseed (page 46-47). Their real-life stories of BioBusiness and commercialisation enhanced the theoretical components of our courses. Future plans include extending the program to include other organisations working with intellectual property and its development.

In 2004, venture capital investment and government funding for IMBcom companies included: Xenome $2 million; Promics $3 million; Protagonist $526,315; Nanomics Biosystems $277,000; Kalthera $150,000; and Nephrogenix $425,000.

JKMRC and JKTech
www.jkmrc.uq.edu.au

Our Julius Krutttschnitt Mineral Research Centre (JKMRC) launched an ARC-funded project researching froth flotation – a vital unit operation in minerals processing.

Improvements will boost value recovery, reduce metal losses to tailings (waste) and decrease energy consumption (and consequently greenhouse gas emissions).

JKMRC, with the University of Tasmania, is spearheading development of a new professional discipline for the minerals industry – geometallurgy. This merges traditional geology and metallurgy. The two groups are collaborating through AMIRA International’s Geometallurgical Mapping and Mine Modelling P843 Project, also known as GEM™.

Aimed at defining and measuring the attributes of new ore bodies, GEM™ involves geological, geotechnical and metallurgical criteria and incorporates the results in a single integrated methodology for mine planning. The GEM™ project aims to establish a strong science base for the methodology and begin teaching geometallurgy to the minerals industry. Mine sites covering gold, copper, lead and zinc in the USA and Australia have assisted the project for geometallurgical field work.

The first JKMRC international postgraduate conference this year attracted delegates...
from 16 academic institutions in eight countries. The event was supported by 27 leading international mining industry organisations and included an award of $4000 for best conference presentation and paper.

The Centre’s commercial division, JKTech Pty Ltd www.jkttech.com.au (page 10), appointed its first full-time managing director during 2004, to guide strategic positioning for: technology transfer; consulting and laboratory services; and delivery of specialist software systems to the domestic and international minerals industries.

Encouraging excellence

Supporting our own

Our research-related expenditure supports researchers across all disciplines.

We allocate most funds received through the Commonwealth Institutional Grants Scheme (IGS) and Research Training Scheme (RTS) directly to faculties according to their research performance. In 2004 this performance-based component totalled $51.6 million and represented one third of the operational funds allocated. The remaining $2.5 million of IGS funding went to internal, competitive grants schemes to support early-career researchers and provide seed feeding for promising projects.

This year our internal Research Only Budget used $9.379 million to:

- fund staff development in research;
- support research excellence;
- seed fund research initiatives; and
- maintain research infrastructure.

We recognised outstanding performance and leadership potential in our staff by awarding prizes for the best research and research supervision performance (page 32). We also supported individual excellence with:

- training and mentoring projects;
- a $12,000 start-up package for new research staff;
- 146 internal grants totalling $2.79 million to help researchers develop external funding applications; and
- 18 UQ Postdoctoral Research Fellowships, including three specifically for women (page 51).

We boosted support for early-career researchers by presenting 10 UQ Foundation Research Excellence Awards (page 44) totalling $655,000. This built on seven awards made in the previous year.
Research training

Postgraduate profile
National scholarship performance benchmarks our strengths in research and research training. In 2004 Commonwealth Government-funded scholarships, we ranked third for Australian Postgraduate Awards (APA) with 142 awards – nine percent of the total.

We enrolled 10,304 postgraduates representing 27 percent of the student body. The Postgraduate Education Loans Scheme (PELS) again increased postgraduate coursework enrolments, which this year accounted for 17.4 percent of all students.

We conferred 3040 postgraduate degrees including 419 PhDs.

While our research objectives and priorities remained similar to those of the previous year, we increased our efforts to attract, retain, educate and graduate higher degree students. This category numbered 3682 this year, with 3079 PhD students (508 international) and 603 research masters (88 international).

As part of our quest for ongoing improvements, we shortened the standard examination period for research masters degrees to four weeks and are examining post-confirmation policies and procedures for research students.

Maintaining excellence
Research students are a core element of our research culture. Since its establishment in 1998, our Graduate School has coordinated skills development programs for graduate research students and their advisors, and directed resources to enhance national and international links for research students.

Our commitment to excellent postgraduate training this year included annual awards for good supervision (page 32) and incentives for postgraduate study. We also backed graduate student education services via our annual evaluation of schools (page 39) and distribution of funds based on research performance indicators (page 48).

Processes for monitoring progress included exit surveys for completing and withdrawing students, and these showed a high level of satisfaction with our PhD program. We also developed advanced systems for tracking and monitoring completion rates for each cohort.

Our Graduate School and our Social Research Centre won a DEST Higher Education Innovation Program grant to investigate the skills and training of PhD graduates, how this is used in their careers and additional skills they might need after ending formal study.

Graduate School
Quality research training incorporated opportunities for travel, exchanges, internships and industry collaboration. Initiatives this year included:
- workshops on research higher degree supervisory practices;
- concurrent graduate certificates;
- a stronger advisory team for research students;
- more support for students and projects at confirmation stage; and
- streamlined examination procedures.

Supporting our own
Graduate School Research Scholarships at APA rates again supported our best candidates. This year we gave:
- 32 Postgraduate Research Scholarships (UQPRS);
- 40 Graduate School Scholarships (UQGSS);
- 30 UQGSS (I), a living allowance for international students to complement IPRS; and
- 18 Mid-Year Scholarships (UQMYS).

Other support included:
- Research Training Scheme places for all domestic research higher degree students;
- 76 Graduate School Research Travel Awards (making a total of more than 500 since the scheme’s introduction in 1998);
- four dedicated Graduate School Study Centres in our libraries;
- about 350 dedicated postgraduate research office student spaces in various buildings on our St Lucia campus;
- Graduate Student Week, organised by the School with help from the Library (page 34), Student Support Services and the Student Union;
- funding assistance for 11 postgraduate research student conferences including a Physical Sciences Conference, Health and Rehabilitation Sciences Conference, Human Movement Studies Conference and a Life Sciences Conference; and
- funding assistance for an academic visitor to the School of Life Sciences.

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<th>POSTGRADUATE ENROLMENTS</th>
<th>2003</th>
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<tr>
<td>Doctorate by research</td>
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<td>Doctorate by coursework</td>
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<td>Masters by research</td>
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<td>Masters by coursework</td>
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<td>Postgrad/graduate diploma</td>
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POSTGRADUATE ENROLMENTS
at August 31, 2004
Our Institutes: world-class research and training ...

- **AIBN** (Australian Institute for Bioengineering and Nanotechnology): Australia’s first fully-integrated, multidisciplinary research institute encompassing bioengineering and nanotechnology, aimed at improving human health and quality of life
- **IMB** (Institute for Molecular Bioscience): Australia’s largest integrated bioscience research complex, fostering research ranging from genomics and bioinformatics to development of new drugs and diagnostics
- **QBI** (Queensland Brain Institute): researching brain physiology, cell and molecular neuroscience, systems physiology, behavioural and cognitive neuroscience; and exploring mechanisms by which the adult brain adapts to change by generating new nerve cells and new functional connections
- **SMI** (Sustainable Minerals Institute): working with Australia’s mining industry to achieve responsible socio-economic growth; and researching at operational levels to find practical ways to bridge gaps between high-level ideas and their coal-face implementation

Graduate attributes

Our Postgraduate Studies Committee and Academic Board endorsed a set of attributes expected of higher degree research graduates. These attributes will be mapped onto a set of training opportunities available at appropriate stages of their candidature. The Integrated Skills Program, developed in 1999, provides a structural model and cooperation with other University units will enhance and expand this program.

Research infrastructure

Sustaining excellence

We develop and maintain an excellent research infrastructure to sustain high-level research. Strong infrastructure attracts high-quality staff and boosts capacity to train the next generation of researchers.

Our HyShot research group upgraded a key ground test facility ahead of three experimental scramjet flights in Woomera scheduled for late 2005. Scramjets are the world’s fastest air-breathing engines. Our T4 shock tunnel at St Lucia can now simulate true flight conditions of Mach 10 (11,000 km/hour) at a 30km altitude. We also invested about $450,000 into the upgrade of the HyShot payload assembly area, and infrastructure to house and support this expanding group.

We began developing the $60 million Pharmacy Australia Centre of Excellence (PACE) on land adjoining Brisbane’s Princess Alexandra Hospital. PACE will combine Australia’s leading pharmacy educators and researchers, key pharmacy professional organisations and commercial research and development. The Queensland Government donated the $3.35 million, 1.7 hectare site which will include a new School of Pharmacy. Research at PACE could slice millions from Australia’s pharmaceutical benefits bill through better use of medicines.

We won a $30 million, 10-year contract to develop a Centre for Military and Veterans’ Health, a consortium unique in Australia. Led by our University, Charles Darwin University and the University of Adelaide, it will facilitate research for the Departments of Defence and Veterans’ Affairs, and provide training for defence health care providers.

Other infrastructure advances included:
- a new teaching laboratory and four specialty laboratories at our Moreton Bay Research Station on Stradbroke Island;
- certification of our ITS Research Laboratory in Civil Engineering as the first Australian member of the Intergraph Registered Research Laboratory Program; and
- an advanced electron analytical facility for south-east Queensland.

We excelled in the latest round of grants from the Queensland Government *Smart State* Research Facilities Fund. We were leading partners on three successful bids, winning about $20 million in funding for the following projects.
- The Centre for Advanced Animal Science ($9.5 million grant), in partnership with the Queensland Department of Primary Industries and Fisheries, will establish an $18.5 million animal health facility at UQ Gatton.
- The Queensland Preclinical Drug Development Facility ($8.1 million) will take potential pharmaceutical products from the discovery phase to clinical trials.
- Our Queensland Hypersonic Testing Facility ($2.2 million) will integrate the world’s most advanced hypersonic and super-orbital ground-testing facilities, advanced computational modelling facilities and free-flight testing facilities.

Equity and diversity

The Equity Office (pages 29, 65,70), having initiated the International Equity Benchmarking Project, continued to take a lead role in the initiative with international and national benchmarking partners (*Universitas 21* and *Go8*, pages 4-5) plus local universities. In 2004-05, group activities include trialling an equity index tool, developing equity indicators for student support programs, and examining criteria used in applying for promotion to professor.
We highlighted equity and diversity issues during Research Week (page 54) through seminars on topics such as Academic job interviews, Career building in academe and Nuts and bolts of working as a UQ researcher.

We also coordinated a seminar with the Gender Equity Subcommittee for research-only women, discussing career advancement and promotion.

Other encouragement for research included awards to help women return to academic careers following interruptions or delays due to family or other responsibilities:

- three Postdoctoral Research Fellowships for Women; and
- two Return to Research Scholarships (renamed from Re-entry Scholarships).

Six staff won Promoting Women Fellowships, aimed at increasing the number of women successfully applying for academic promotion.

The year 2005

- Our HyShot team will collaborate with ANU plus Australian and US defence interests on a project aimed at achieving three experimental scramjet flights at Woomera, reaching Mach 10 (11,000 km/hour).
- We will map attributes for higher degree research graduates onto a set of training opportunities available during candidature.
- The $18.2 million Sustainable Minerals Institute building will be completed on the St Lucia campus, facilitating research aimed at helping the mining industry achieve responsible growth.

Cooler, colder, coldest... Professor Halina Rubinsztein-Dunlop and Dr Matthew Davis led a School of Physical Sciences team that produced the coldest-known substance, produced by cooling atoms to almost absolute zero (−273.15 Celsius) to achieve a new state of matter known as a Bose-Einstein condensate. The experiment was one of only a handful in the world – and the first in the southern hemisphere – created on an atom chip.