

Bulletin

NEW EYES

in southern skies
for atmospheric
studies



\$16 million

RESEARCH BOOST



IN THIS ISSUE

- La Trobe gains \$16m
for new research **3**
- Sports management can
score goals for export **4**
- Collaboration to boost
ICT industries **5**
- INU meets for better global
understanding **6**
- Focus on world finance **6**

Research in Action

- Keeping a better eye
on space weather **7**
- X-ray science:
New frontiers in imaging **8&9**
- Physicists collaborate
for invisible worlds **10**

- NHMRC grants for health
and biomedicine **11&12**
- Families first: Bouverie Centre
celebrates 50 years **13**
- Health Sciences – making
a difference **14**
- Young people leaving
state care need more support **15**
- Bowlers also feel the pain **16**



Cover: La Trobe University scientists have developed new equipment which they are taking to Antarctica to speed up critical atmospheric research – see *Research in Action*, page 7. Digitally manipulated image. Design: Greg Nelson

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New Vice-Chancellor

appointed

become Vice-Chancellor following the early retirement of the former Vice-Chancellor, Professor Michael Osborne. ●



LA TROBE UNIVERSITY has appointed Professor Paul Johnson, Deputy Director at the London School of Economics, as its next Vice-Chancellor and President.

Professor Johnson, who is also Professor of Economic History at the London School of Economics, holds an MA and DPhil from the University of Oxford.

An internationally recognised scholar and researcher in the fields of modern economic history and the economics of ageing and pensions, he has been elected to senior positions within the Economic History Society and the Social History Society, as well as to fellowships of the Royal Historical Society and the Australian Academy of Social Sciences.

As an expert on pension systems and pension reform, Professor Johnson has worked as a consultant for the World Bank in Washington and in various Central Asian republics, for the UK government, the United Nations Research Institute for Social Development, and the Australian Productivity Commission. He has also held visiting fellowships at the Australian National University and the University of Melbourne.

Announcing the appointment, Chancellor, Mrs Sylvia Walton, said that the University was delighted to have appointed Professor Johnson following a rigorous and intensive selection process.

The Council also acknowledged the leadership displayed by Professor Brian Stoddart who stepped in at short notice to

RESIGNATION OF BRIAN STODDART

The current Vice-Chancellor, Professor Brian Stoddart, has resigned from the University and will leave upon the completion of his term at the end of December 2006.

In accepting his resignation, the Council conveyed to Professor Stoddart its sincere thanks for his outstanding leadership and management of the University since the departure of Professor Osborne.

It noted that Professor Stoddart stepped in at short notice to meet the Council's request to become Vice-Chancellor, and his commitment and innovation have helped the University make considerable change and to prepare for more change in the Australian higher education context.

Chancellor Walton said: 'Professor Stoddart has displayed leadership qualities of the highest order, and his many substantial achievements in a very short space of time have been of critical importance to the University and its future. His work both within the University and in the external environment has been invaluable for La Trobe at an important point in its development.' ●



La Trobe gains \$16m for new research

LA TROBE UNIVERSITY has received \$16 million in the latest round of Australian Research Council and National Health and Medical Research Council grants

Vice-Chancellor, Professor Brian Stoddart said the University's results in both of the highly competitive grants schemes were a considerable achievement and an improvement on last year.

With a success rate well above national average, La Trobe won 12 grants worth more than \$8 million from the National Health and Medical Research Council (NHMRC) for studies into a range of diseases including cancer, malaria and Alzheimer's, as well as drug design, maternal health and improved public health services.

Pro Vice-Chancellor (Research) Professor Erich Weigold said La Trobe's success rate for NHMRC project approval was 31 per cent – ten percent higher than the national average – the highest of any university in the country.

'This is a great credit to our biomedical and health scientists by any standard, and especially so considering the University does not have a medical faculty.

'If you compare the result in terms of average dollars per grant, La Trobe is up there with the top Victorian medical universities.'

The University also received \$8m from the Australian Research Council (ARC) for new research – almost \$6.6 million for 18 major research projects and an additional \$1.5 million for special research infrastructure and equipment.

Professor Weigold said this was extremely encouraging. 'Our performance in Discovery and Linkage Grants ranks us second among the Innovative Research Universities of Australia.'

La Trobe was awarded 13 Discovery Grants for projects totalling more than \$3.5million. These involve fundamental research important for national innovation.

It also gained almost \$1million for four Linkage Grants – with an additional \$2.1 million contribution from industry partnerships. In the Linkage Grants, designed to secure commercial and

community benefits, La Trobe University had a success rate of 57 per cent – compared with the national average of 42.9 per cent.

'We were also one of only 12 universities to receive a special Development grant for Indigenous researchers – and one of 11 to be awarded an International Linkage Grant,' Professor Weigold said.

Adolescent mental health and malaria

LA TROBE research teams will tackle a wide range of issues with new funding from the Australian Research Council.

These include studies in adolescent mental health and supportive classroom environments, investigating organisational supports as mediators to reduce aggressive classroom management in partnership with VicHealth and a number of local secondary schools.

The environmental impact on neuroendocrine and neurobiological mechanisms for treatment strategies for maintaining good health will be examined under a large five year project with Jim's Group and the Bionic Ear Institute.

Researchers will help protect the environment by studying mountain pygmy possums and an important Indigenous icon, the Bogong Moth, and carry out world-leading studies into waste water treatment. Another project, highlighted by the government in its announcement of the grants, will assess the ABC's role in how Australia is perceived in Asia at this critical time.

Others will assist in malarial vaccine development, DNA-anticancer drug interaction and biomarker discovery as part of national biotechnology and medical research priorities, research which has also been supported by the NHMRC, see page 12.

La Trobe staff have also received

three out of eight grants awarded for linguistics research across the whole Discovery Projects area. And in archaeology, a substantial grant – which includes one of two postdoctoral fellowships awarded to the University – will be used to study the origins of Asian domestic buffalo and its role in the development of agricultural technology.

Announcing the grants, the Minister for Education, Science and Training, Ms Julie Bishop, said they were awarded to projects that, in the medium- to long-term, are likely to produce results that will have a significant impact on the daily lives of all Australians.

'The growing demand and increased competition for ARC funding is a healthy sign of a strong commitment from Australian researchers to contribute to our innovation capacity. It means that those projects that are funded, along with the associated researchers, are truly outstanding.' ●

More news about research grants page 12



Professor Weigold: NHMRC grants success rate highest of any university in the country.



Sports management can score goals

as export industry

*La Trobe aims
to become the
national leader
within the next
few years.*

LA TROBE UNIVERSITY has appointed two senior academics to Professorial Chairs in the growing field of Sports Management.

They are Dr Hans Westerbeek, Head of the School of Sport, Tourism and Hospitality Management, and Dr Aaron Smith, Associate Head and Director of Research Grants in the School.

Announcing the new appointments, Vice-Chancellor, Professor Brian Stoddart said both men were widely known for their research and teaching and contributions to industry.

‘Sports management is a developing discipline within the Faculty of Law and Management and the University aims to become the national leader in the discipline within the next few years.’

The two new professors already consult widely in the international field of sports management, applying strategic management and international marketing theory to the sport, recreation and leisure industries. Research projects have taken them to countries such as the United Arab Emirates, the Netherlands, the UK and the USA.

Sport and leisure industries, increasingly important in the global context, also serve as popular policy tools for governments and NGOs to achieve community objectives for citizens.

Both men are working on behalf of the Dutch and Australian governments to formulate a Memorandum of Understanding between the two countries for long term collaboration in sport policy development.

Professors Westerbeek and Smith say Australia’s international reputation for state-of-the-art sports administration gives Australia an edge in this growing industry.

‘Many developing countries have little or no tradition in playing and organising sport. With sport becoming a more vital element in nation building, and a benign way

of uniting people, Australia has much to teach the world.

‘We have played sport for 200 years and it has become a way of life, envied by people in other countries. Over those two centuries we have built up expertise in sports management that other countries, particularly in Asia and the Middle East, simply do not have.’

Professor Hans Westerbeek holds a PhD and MBA from Deakin University and an MSc (Research: Pedagogy) and BA (Phys Ed) from the University of Groningen, Netherlands.

Co-author of 11 books in sport management, sport marketing and policy design, he is Visiting Professor at the Free University of Brussels, Belgium, and the Copenhagen Business School in Denmark.

Professor Westerbeek co-founded the European Association for Sport Management and the *European Journal for Sport Management*, and was a founding member of the European Network of Sport Science Institutes.

He was also a founding Board member of the Sport Management Association of Australia and New Zealand and helped establish the *Sport Management Review*.

Professor Westerbeek, left, has established extensive relationships with national and international partners and has just won the International Network of Universities 2006 Henry Fong Award for

Contributions to Global Citizenship. He joined La Trobe University in 2004 from Deakin University’s Centre for Business Research.

Professor Aaron Smith holds a BAppSc (1st class Hons) and a PhD in Management from Victoria University.

Professor Smith’s research, supported by ARC and industry funding, has made a significant contribution in the areas of sport consumer psychology and change management. As author or co-author of 11 books, Professor Smith has been instrumental in shaping the development of sport management theory.

He has worked in the sport facility and event management sectors, consults to sport organisations in Asia, Europe, North America and the Middle East and has been a Visiting Professor at Brussels’ Free University.

Before joining La Trobe, Professor Smith worked at the Bowater School of Management and Marketing at Deakin University and was a senior associate of the Centre for Business Research in Deakin’s Faculty of Business and Law.

Prior to that he was in the Department of Sport, Recreation and Performance, and in the Faculty of Business at Victoria University. ●



Collaboration to **BOOST ICT INDUSTRIES**

LA TROBE UNIVERSITY'S internationally recognised innovative research expertise in computer science, electronic engineering, nano-technology, micro electronics and related disciplines has led to a collaboration with HCL Australia Services Pty Limited – a wholly-owned subsidiary of India's leading IT services company, HCL Technologies Ltd.

The move will boost opportunities for Australian industries involved in information and communication technology (ICT) and business systems (BS) through joint projects and specialist recruitment.

Announcing the agreement, La Trobe University Vice-Chancellor, Professor Brian Stoddart said: 'The University and HCL will use their respective expertise to jointly bid for community and government ICT research and development projects.'

Opportunities for La Trobe students and graduates worldwide

He added: 'HCL will also offer internships to La Trobe students and recruit graduates for projects in Melbourne or other parts of the world. HCL and the University will conduct joint seminars and workshops for the community, and help to bring innovative, research-based solutions from the drawing boards and laboratories to Australia and the world.'

The collaboration combines HCL's strength in processes and its organisational capabilities in managing large scale transformational programs, with La Trobe's knowledge and research capabilities. La Trobe also has Australia's largest, wholly- University-owned and managed technology parks.

The La Trobe R&D Park is also home to the University's Centre for Technology Infusion which engages in applied research, product development, commercialisation, and industry



Somnath Mallick, President of HCL Asia Pacific, left, with Vice-Chancellor Brian Stoddart, right, and La Trobe Commercialisation Manager, Dr Peter Janssen.

development in the ICT sector.

Somnath Mallick, President of HCL Asia Pacific, said the collaboration reflects 'HCL's strategic intent to add value to the local economy'. It will leverage Australian innovation and talent, and, with HCL's value-centric approach, offer business transformational benefits to Australian customers.

Mr Mallick added: 'We've found a great partner in La Trobe University. They have built a reputation for the quality of their programs and research activities in ICT.'

'We look forward to a strong collaboration fully aligned to HCL's strategic intent of building strong, sustainable global networks for knowledge transfer and collaborative, future oriented research to grow a stronger Australian ICT community.'

Under the agreement, HCL and La Trobe will provide opportunities for

experts in each organisation to address interested parties in government and the community on ICT related issues.

A senior academic will be appointed to manage the new relationship. The University may also work with HCL to introduce specific subjects to meet ICT industry needs such as HCL's personnel delivering guest lectures on subjects of core competencies and supporting student-industry exchange programs.

HCL Technologies is one of India's leading global IT services companies. It has a network of offices in 16 countries servicing the financial, retail, life sciences, hi-tech and manufacturing, telecom, media and entertainment sectors.

The agreement was initiated and supported by the State Government of Victoria. ●

Better global understanding



LA TROBE HOSTS INU COUNCIL MEETING



Student Global Citizenship award winner, Ms Shigematsu.

Twenty-five delegates – including five Vice-Chancellors, Deputy Vice-Chancellors and Vice-Presidents – from Europe, the USA, Asia and Australia met on the La Trobe University's main Melbourne campus at Bundoora in November for the Annual Council meeting of the International Network of Universities. The eight-nation 13-member International Network of

Universities (INU) is led by La Trobe and includes Flinders University in Australia. It has boosted student, staff and research interaction across the countries represented on the INU.

The meeting discussed new strategies for expanding collaboration between member universities. INU President, La Trobe's Vice-Chancellor, Professor Brian Stoddart, said these included plans for an international multi-university two-year masters degree in peace studies, strengthening networks for research, administration, and benchmarking of universities.

'An innovative shadowing program for senior and middle level administrative staff is being piloted this year, to strengthen links between universities.'

With little rigorous research to date assessing in detail the benefits of learning abroad, another agenda item was a joint project with James Madison University, US, titled: 'Lessons Learned in Assessing International Learning', funded by the American Council on Education.

Henry Fong Awards for Global Citizenship

The meeting also launched the INU 'Henry Fong Awards for Global Citizenship', with a ceremony for the inaugural winners. Winner of the Student Award, announced at the meeting, was Eri Shigematsu from Hiroshima University. The Staff Award went to La Trobe's Professor Hans Westerbeeck, Head of the School of Sport, Tourism and Hospitality Management. The awards are sponsored by prominent Hong Kong business leader and philanthropist, Dr Henry Fong Yun-Wah, widely known for his support of education and culture.

Professor Stoddart said: 'Through Dr Fong's generous donation, the INU can take another important step towards fulfilling its mission of fostering global understanding and cooperation between developed and less developed nations.'

Focus on world finance

About 500 leading finance professionals, educators, and policy makers from more than 65 countries will gather in Melbourne next April when La Trobe University hosts the 14th Annual Global Finance Conference – the first ever held in the southern hemisphere.

Billed as the world's 'premier finance conference', it has met annually since the early 1990s to debate and exchange ideas to advance education, learning and practice in global finance. Keynote addresses by Nobel Prize winners are a regular feature of the conference.

For the first time, the 2007 conference will offer a Mandarin language session, deal with interest-free banking and

Islamic finance and provide an enhanced legal and regulatory stream. The Chartered Financial Analyst (CFA) Institute has accredited the conference for professional development credits for its members world-wide.

The conference will be opened by former Director-General of the World Trade Organisation, Mike Moore, above, now an Adjunct Professor at La Trobe University. Conference organiser, Head of La Trobe's Law School, Professor Gordon Walker said conference sessions will cover some 24 subject areas over four days from 1 April. These range from banking, insurance, multinational finance, interest rates, corporate governance,



financial crises management to currency issues, emerging markets, privatisation, ethics and social responsibility.

Professor Walker said the best papers from the enhanced legal and regulatory session will be published in a special conference edition of 'Law in Context', the legal journal of the La Trobe Law School.

The conference is being held under the auspices of the Global Finance Association which solicits innovative ideas and research studies in global finance and related disciplines.

Previous conferences have been held in the US, Canada, Germany, China, Turkey, Mexico, Ireland and Brazil.

Keeping a better eye on space weather

Two La Trobe University students have helped develop new scientific equipment for Australia's Mawson Antarctic Base that will greatly speed up a critical aspect of atmospheric research.

The equipment will make a significant contribution to understanding the effects of space weather on communications, navigation, surveillance capability, and the operation of low altitude satellites, according to its designer, space physicist, Dr Mark Conde.

The new Fabry-Perot Spectrometer, built in the University's Physics Department workshop, will replace an existing one at the Mawson Base. It underwent final trials on the University's main Melbourne campus at Bundoora in October, prior to being shipped to Antarctica in November.

The two students involved are Callum Anderson – a PhD researcher who developed the software to control the instrument and who will operate it in Antarctica – and Letizia Sammut, an Honours student responsible for testing and calibrating aspects of the instrument.

Mr Anderson recently completed his Antarctic expeditioner training in Hobart. He will be one of 28 people at the Mawson Base this summer and, for an extended challenge, one of 14 to remain there the whole winter.

Dr Conde, a senior lecturer, and Professor Peter Dyson, Head of the Physics Department, developed the imaging spectrometer over the past three years with the help of a \$335,000 ARC Discovery grant. It was built by Mr Eric Huwald and Mr Habib Rahman in the Physics Department's technical workshop.

Research Fellow, Mr Theo Davies who worked with Dr Conde and Professor Dyson on the spectrometer, will also go to Mawson for the summer to help install the instrument and check on another La Trobe instrument at the Davis Base.

Dr Conde says the new device will be used to observe the very top layers of Earth's atmosphere, measuring shifts in the wavelength of light as it passes through gases in this region.

This data is used to calculate wind

and temperature disturbances as the atmosphere is buffeted by eruptions from the Sun – the solar wind. Depending on their intensity and location, these disturbances can interfere with navigation, communication and other equipment – especially at the high latitudes of Antarctica.

Optical remote sensing obtains a close-up picture of wind patterns at an altitude that previously has been in the space weatherman's 'too hard basket': too high for aircraft or balloon observations, and too low for orbiting satellites.

Aircraft and balloons, says Dr Conde, are effective for probing up to about 50 kms, and satellites for measurements down to about 400 kms above the Earth's surface. Which leaves radar, and optical remote sensing systems such as this new equipment, to study the area in between. La Trobe has long been recognised for its research in

Continued page 12



Mr Anderson, left, Ms Sammut and Dr Conde conduct final trials at the University before the instrument is shipped to Antarctica.

A tale of interferometers and salad bowls

The new instrument is about half a metre wide and two metres high, small enough to be transported from the supply ship to Mawson Base by helicopter. It comprises a sky camera, worth about \$300,000. The camera includes spectral filters and after the image passes through these it is directed to a computer for processing.

The instrument's main optical element, two parallel highly-reflective mirrors (the interferometer or etalon), was obtained from the University of Lancaster. It had previously been used for similar research in Sweden as part of a project involving Germany's Max Planck Institute.

While some components have such elevated scientific pedigrees, others have been sourced from a homewares supermarket: two steel salad bowls were joined to form a spherical diffusion chamber which generates the uniform light source. ●

CENTRE OF EXCELLENCE FOR COHERENT XRAY SCIENCE TARGETS

New frontiers in imaging

La Trobe physicists and biologists and their partner-colleagues at the \$17 million Australian Research Council Centre of Excellence for Coherent X-ray Science are collaborating with the world's leading beam-line scientists in a global race to develop novel, high-resolution X-ray techniques for imaging single protein molecules.

The Melbourne-based Centre is at the forefront of a close-knit, multi-national community of scientists fast-forwarding X-ray science towards new frontiers in the application of physics to biological, medical and environmental science.

They expect soon to cross thresholds as collaborators they might never otherwise have conquered, engaging a powerful combination of modern X-ray sources and algorithms to illuminate the sub-cellular architecture of the single protein molecule.

Centre of Excellence scientists from La Trobe, Monash, Melbourne and Swinburne universities and the CSIRO are working collaboratively with beam-line specialists in Japan, Taiwan, the United States and Europe to push third-generation X-ray sources to their limits in developing experimental new techniques to facilitate this.

Knowledge of some sub-cellular protein structures still elude science – and the pharmaceutical industry – despite all the advances of X-ray crystallography and other techniques. This is because it is impossible to make crystals for most proteins of interest involved in the human body, and X-ray crystallography requires the proteins to be in crystal form.

Intent on pushing the boundaries still further when X-ray Free Electron Lasers come on-stream – with X-ray light beams 10 orders of magnitude brighter than current Synchrotron sources – the Centre's scientists are developing imaging

techniques they believe will take X-ray science beyond these limitations.

La Trobe physicists, in collaboration with US physicist Professor Chris Jacobsen from Stony Brook University, New York, have already brainstormed the conceptual approach for implementing this novel new imaging technique using existing light sources.

Head of the Centre's Experimental Group, La Trobe physicist and QE11 Research Fellow, Dr Andrew Peele, says: 'If it works we will have developed a mechanism for viewing the architecture and machinery of life, giving us a clearer understanding of cellular and sub-cellular function and the capability for improving rational drug design.'

By interlocking new techniques in X-ray physics, computational mathematics and structural biology, the scientists have developed a process they believe will help them to 'see' the physical and chemical structure of a single protein molecule by calculating backwards from a projected, finely-resolved three-dimensional 'image' of a protein cell sample.

The 'image' is actually a diffracted pattern of light projected onto a detector by shining a powerful X-ray beam through a cryogenically-frozen cell sample – a technique commonly used in crystallography to 'see' backwards to the internal structure of the original crystalline object.

The techniques of conventional crystallography use the knowledge that the diffraction pattern resulting from light scattered from a periodic (i.e. crystalline) structure makes it possible to deduce one of the critical features of the wavefield





Quest for the 'Holy Grail' from left, Dr Peele, Professor Tilley and Dr Ryan.

of the diffraction pattern, and it gives us a better handle on the inversion technique. It makes the iterative process for determining the phase faster, it makes solution more robust to certain problems in the beam, and it allows you to reconstruct certain types of samples that you can't reconstruct using other methods.

'The down side is that it's a lot harder to do experimentally. With the traditional method you can put a sample in the beam and it's very forgiving of the sample moving slightly. With our method the sample has to be kept stable, possibly to the level of nanometers, and that's a very difficult engineering problem.

'It is a novel idea, and we're developing ways to improve it, but it's a difficult thing to design. That's where Chris Jacobsen comes in.' (See next page.)

generated, that is, its 'phase.'

It is the knowledge of 'phase' in combination with another critical feature, 'intensity', that allows scientists to calculate back from the diffraction pattern to obtain information about the internal structure of the original object.

(If you think of 'intensity' as you might perceive the height of a water wave, and 'phase' as the position of the 'peaks and troughs', you won't be far wrong.)

When the diffraction pattern is produced by an object that is not 'periodic', the crystallographic method does not work, and scientists must find another way to determine the phase.

Physicists call this difficulty in obtaining the phase in the diffraction pattern 'the phase problem', describing 'solving for the phase' as 'the Holy Grail' of computational physics.

The Melbourne-based group says the crux of the matter is finding another piece of information about the sample, for instance that it is small and isolated, which allows them to design an algorithm to facilitate a 'guess the phase' technique, thereby enabling the same process for 'seeing backwards' that works in conventional crystallography.

They have developed a variant of the standard algorithm for doing this which

involves illuminating the sample object with a pin-point of light instead of a parallel beam, resulting in the projected beam spreading out in a spherical diffraction pattern like a balloon, instead of a straight wave. Knowing the characteristics of the illuminating beam is another piece of information that helps determine the phase.

Initial experiments have proved successful and they are now constructing the hardware which will improve on the concept, including the phase-defining algorithm. Tests will be conducted initially using a Melbourne-based source of laser X-rays, and subsequently the highly coherent beamlines at overseas synchrotrons.

Dr Peele explains: 'This technique of taking the 'intensity' and hazarding a guess at the 'phase' and then doing this circular iteration is a standard method known as the Gerchberg Saxton algorithm.

'What we've been developing at the Centre is a variant on that idea, which says that instead of shining a parallel beam onto the sample and getting a characteristic type of diffraction pattern, we can take a beam that is structured – that is, focused down to a point and spreading out in a spherical way – in what is known as curved beam illumination.

'What that does is to change the nature

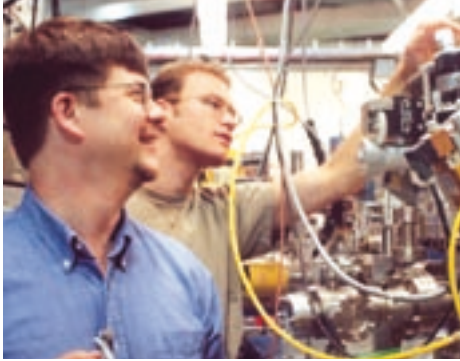
PARTNERS IN THE CENTRE

ARC Centre of Excellence for Coherent X-ray Science groups involved in the experiment include the Theory and Modelling Group (led by Dr Harry Quiney from the University of Melbourne); the Experimental X-ray Science Group (led by Dr Peele, La Trobe); the Biochemistry and Structural Biology Group (led by La Trobe biochemists Professor Leann Tilley and Dr Mike Ryan); the Laser Physics and Technology Group (led by Professor Lap Van Dao, Swinburne University of Technology); and the Detectors & Instrumentation Group (led by Professor Rob Lewis, Monash University.)

Synchrotrons involved include the Advanced Photon Source Synchrotron in Chicago, the Spring 8 Synchrotron in Japan, the National Synchrotron Radiation Research Centre in Taiwan, and the European Synchrotron Research Facility in France. ●



Physicists collaborate for INVISIBLE WORLDS



Professor Jacobsen, left, with a student in his laboratory.

For those who ponder the mysteries of molecular science and how it works at the extra-molecular level – that is, up here in the visible world – here's good advice: talk to a bilingual physicist.

Perhaps one like Professor Chris Jacobsen, a US physicist in residence recently at La Trobe's Institute for Advanced Studies, who simplifies the nano-scale mysteries of electron microscopy in the sub-cellular world of biology by talking about sawing a centimeter-thick slice through your car to see how the transmission works.

It's a bit like visualising the anatomy of a mosquito by dismantling a bulldozer, but you get the picture: they're both compositions of intricate engineering.

So it isn't difficult to imagine a scene in the physics labs at La Trobe or at his home institute (Stony Brook University, New York), with Professor Jacobsen and his colleagues brainstorming the barricades of yet-to-be-known applications of physics to discover revolutionary new ways of imaging the invisible world of biology.

Among his fellow-scientists at La Trobe recently, Professor Jacobsen contributed similarly innovative techniques to take the newly-emerging science of coherent X-ray imaging a step closer to its ultimate goal – to use the ever-brightening sources of coherent light from facilities such as synchrotrons to image the atomic structure of a single protein molecule.

One of a closely-knit world community of physicists, biochemists and biologists drawn together by their common goal,

Professor Jacobsen is collaborating with Melbourne-based scientists in the ARC Centre of Excellence for Coherent X-Ray Science (see previous page) to help push high-resolution X-ray imagery into a new realm - beyond the limitations currently experienced using such techniques as light microscopy, crystallography and electron microscopy.

They are seeking a technique to obtain three-dimensional, tomographic images of the inside structure of a single cell at the finest possible resolution – ultimately, they hope, at the molecular level – without first damaging the cell.

Calling on Professor Jacobsen's own work at Stony Brook (most recently demonstrating X-ray diffraction microscopy to image an intact freeze-dried yeast cell), and the pioneering science of Professors John Miao at the University of California (the first scientist to demonstrate coherent diffraction as an imaging technique), and Henry Chapman, Group Leader at Lawrence Livermore National Laboratory, California (also instrumental in developing these techniques), the Melbourne group has designed a new experiment they believe will carry the science across its next threshold.

Brainstorming with physicists, biochemists and biologists.

Professor Jacobsen has worked with the physicists, biochemists and biologists at La Trobe and other institutions involved in the Centre for the past few months to design the concept and refine the hardware to undertake the experiment.

Like the sliced-up car, the apparent simplicity of the hardware belies the complexity of the concept behind it: in fact the engineering as well as the physics and the biochemistry involved are precise and complex.

'We've had a series of brainstorming sessions where we've tried to design a new approach, to build on the imaging apparatus we've developed for our own work in the US – both to make an improved version of that, and to devise

a new experimental approach that will move high resolution X-ray imagery forward,' Professor Jacobsen says.

'The way these things go is you sketch out something that is rough, you develop a viable approach, then you have to sit down and do the nitty-gritty of design – and that takes a long time.

'We now have the conceptual design, and the bulk of the detailed design will be done here at La Trobe. That will take six months, and to get it built will take another six months, then I'll come back and we'll look at it again to see if it works.'

While Professor Jacobsen's sawn-up car nicely illustrates the contrast between X-ray imagery and electron microscopy (with electron microscopy you can't see how the transmission relates to the engine), La Trobe QEII Research Fellow and physicist Dr Andrew Peele has a tendency to explain in stereo:

'Electron microscopy gives you the cross section in greater detail; X-rays give you the full volume,' he says.

For the coherent headlights required to illuminate the experiment, the scientists will consult their in-house beamline mechanics: Beamline Scientist and Group Leader at the Advanced Photon Synchrotron in Chicago, Dr Ian McNulty, Beamline Group Leader Professor Ishikawa at the Spring 8 Synchrotron in (Tokyo), and collaborators at the National Synchrotron Radiation Research Centre, Taiwan.

For the high-octane brain-waves facilitating this venture, Professor Jacobsen looks directly to the inter-institutional ARC Centre of Excellence for Coherent X-ray Science.

'There's not quite anything like this world-wide, it's unique,' he says. ●



NHMRC grants for maternal health and biomedicine

LA TROBE UNIVERSITY has received 12 grants worth more than \$8 million from the National Health and Medical Research Council for studies into diseases including cancer, malaria and Alzheimer's, as well as drug design, maternal health and improved public health services.

The prestigious and highly competitive research awards were announced by Health Minister, Mr Tony Abbott in October.

Professor **Judith Lumley** from the Mother & Child Health Research Centre has received a \$2.3million 'Capacity-Building Grant' to support continuing education and development for postdoctoral staff in their transition from completing a PhD to becoming independent researchers.

The aim is to help them initiate their own research programs and secure competitive funding for research into a range of problems, from premature birth to partner violence.

'The program also involves the Department of General Practice at the University of Melbourne, with whom we have a long history of successful collaboration and common interests in mothers' and children's health, including research with Indigenous and immigrant women, says Professor Lumley. 'Some of these projects have also been supported separately with additional funding.'

Associate Professor, **Stephanie Brown** has received almost \$1 million for a study of women giving birth in South Australia and Victoria. She will investigate childbirth and early postnatal experiences, and the physical and emotional health of more



than 7000 women in metropolitan, regional and remote areas.

'The aim is to give women in each state the opportunity to provide feedback on changes to the organisation of maternity and early postnatal services,' she says. A parallel project will involve Indigenous women.

With another grant, valued at \$628,000, Dr Brown will follow-up more than 1,500 women in a longitudinal study of their health during pregnancy and in the four years after the birth of their first child.

The study will provide the first Australian data on the incidence of maternal health problems – including urinary incontinence, sexual health issues and depression – and add to international evidence concerning the role of birth events in maternal health outcomes. Findings will be used to design intervention and primary care strategies to support women in the early years of parenting.

Dr Helen McLachlan from the School of Nursing and Midwifery, with colleagues from Mother & Child Health Research and the Royal Women's Hospital, has

received \$583,000 for the first randomised controlled trial in Australia of caseload midwifery care for women at low risk of medical complications – and, she says, it is only the third such trial she is aware of in the world.

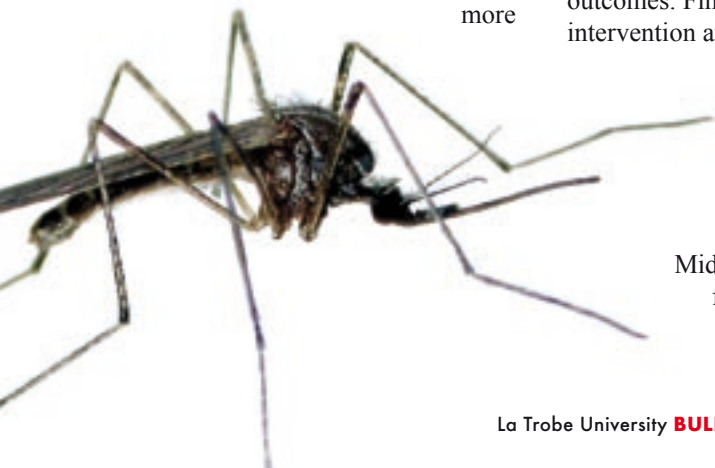
'It is a unique opportunity to provide a rigorous evaluation of a model that is beginning to be implemented widely in Australia. The trial will provide much needed information regarding the outcomes of caseload midwifery, including interventions in childbirth, safety, costs, women's satisfaction with care and impact on the midwifery workforce.'

Dr Hylton Menz from the Musculoskeletal Research Centre in the School of Physiotherapy has received a Clinical Career Development Award of \$445,000 to continue his research into the epidemiology and management of foot disorders in community-dwelling older Australians.

This project involves determining the prevalence of common foot disorders in a large sample of older people, exploring the impact of foot disorders on mobility and quality of life, and assessing the efficacy of various conservative treatments.

Professor **Leann Tilley**, from the

Continued page 12.



Continued from page 11.

Department of Biochemistry, has been awarded \$526,500 for research using cell biology techniques to introduce foreign genes into malaria parasite-infected red blood cells. The research aims to unravel the molecular ‘machinery’ and ‘ticketing’ system used by the parasite to ‘traffic’ its virulence proteins to their correct destinations.

Professor Tilley says as resistance to anti-malarial drugs increases, the study could lead to new ways to fight malaria, which kills between 1 and 3 million children each year. The disease also debilitates adult population in malaria-endemic areas, thereby contributing to the cycle of poverty in many third world countries.

Another biochemist, Dr **Christine Hawkins**, has won \$563,000 to study ‘apoptosis’, or programmed cell death, which eliminates unwanted and dangerous cells. Mistakes in regulating apoptosis can contribute to many conditions including cancer, autoimmune and degenerative diseases.

Her project will exploit biochemical approaches to explore cell death pathways of a round worm, the nematode *Caenorhabditis elegans*, and compare these with apoptosis pathways in mammals.

She says: ‘Understanding the way in which mammalian apoptosis is regulated may be of clinical benefit, helping in the design of diagnostic and therapeutic reagents for many of these diseases.’

A colleague, Dr **John Silke**, has received \$375,000 for another project relating to killing tumour cells and the role of Inhibitor of Apoptosis Proteins.

He says melanomas and gliomas are tumour types that respond poorly to current treatments which are not only generally ineffective, but also unpleasant and destructive of healthy cells.

‘We will test two new targeted anti-cancer treatments that so far appear to have minor side effects in small animal models, and determine whether these treatments can work together to kill tumours more effectively.’

Dr Silke will continue to work closely with La Trobe’s Federation Fellow, Professor **David Vaux**, who was a chief investigator on an NHMRC Program Grant with colleagues at the Walter and Eliza Hall Institute that will bring an additional \$2million to La Trobe over the next five years.

A fifth biochemist, Associate Professor **Mike Ryan**, has obtained two grants – one valued at \$448,000 and another \$462,000 dealing with mitochondrial research. Mitochondria are sub-cellular compartments that produce most of the energy for our bodies. Dr Ryan says while we now realise the great importance of mitochondria to human cells, we are only beginning to work out they undergo drastic changes in their shape, which is essential for cellular function.

His research aims to identify and characterise the proteins involved in the movement and shaping of mitochondria, and how they generate energy.

‘Understanding the fundamental mechanisms of mitochondrial dynamics will provide valuable insights into mitochondrial segregation and specialisation in cells and their defects that can lead to infant death, degenerative diseases such as Parkinson’s and Alzheimer’s, and type-2 diabetes,’ he said.

In the University’s Muscle Research Group, based in the Department of Zoology, Professor **Graham Lamb** and Dr Robyn Murphy have been awarded \$347,000 to investigate the role of calcium-dependent proteases in muscle damage and disease while Professor **George Stephenson** and Dr Mark Jois received \$372,000 to study the regulation of protein synthesis in skeletal muscle fibres using a novel approach.

Skeletal muscle is the most abundant tissue in the human body and accounts for more than 40 per cent of body weight. Loss of muscle mass is a major cause of frailty in the elderly and common to chronic diseases such as cancer, HIV, arthritis and heart failure.

Professor Stephenson says his research will contribute to understanding the regulation of cellular and molecular events underpinning protein synthesis in muscle.

‘This is critical for the treatment and management of various medical conditions to prevent muscle wasting,’ he said.

Professor Lamb’s work will probe a family of proteins called ‘calpains’ that breakdown other proteins and play a key role in various types of muscular dystrophy as well as normal muscle fibre repair.

‘Our research will help elucidate where exactly calpains are located within a muscle fibre, what activates them and what proteins they target.’ ●

SPACE WEATHER RESEARCH

Continued from page 7

this region of the atmosphere using both these systems, see below.

The University’s research in Antarctica using radio, magnetic and optical remote sensing goes back to the 1960s. About 15 students and staff have taken part in scientific expeditions to the frozen continent during that time.

Dr Conde explains the new spectrometer is a major improvement on the first generation of optical remote sensing instruments, which have operated since the 1970s, and are in some cases still being used. These older instruments have small telescopes that need to focus on one part of the sky for about ten minutes to gather sufficient airglow data.

‘Using a fish-eye lens, the new instrument can observe the entire sky simultaneously, mapping wind and temperature variations across 1,000 km in diameter. Coupled with vastly superior computerised image processing, it examines about 40 to 50 regions in the sky at once, from 20 degrees above the horizon to the zenith. This is a huge increase in capacity and ushers in a new era of optical remote sensing research.’ ●

La Trobe University also leads the TIGER – Tasman International Geospace Environmental Radar – project. TIGER comprises two radar arrays, one at Bruny Island, Tasmania, and one at Invercargill, New Zealand. It maps features in the ionosphere associated with the aurora and other high-altitude space weather phenomena.

The TIGER radar project was initiated and developed by Professor Dyson. The instrumentation was developed at La Trobe by Electronic Engineering colleague, Associate Professor John Devlin. TIGER is supported and operated by a consortium of university, government, and international partners.

Families first

THE BOUVERIE CENTRE CELEBRATES 50 YEARS -
AND MOVES TO A NEW HOME



LA TROBE UNIVERSITY'S Bouverie Centre recently celebrated its 50th Anniversary – and the beginning of work on its new building in Brunswick.

Announcing its permanent home, in Gardiner St, Brunswick, Health Minister Bronwyn Pike spoke about the Centre's reputation – and the contribution it has made to mental health services for families.

Victoria's Family Institute, the Bouverie Centre has been part of the Faculty of Health Sciences since 1996. It began life as the Bouverie Clinic in Carlton in 1956.

Centre Director, Dr Colin Riess, says that with funding from the Department of Human Services in the late 1990s, the Bouverie Centre developed a groundbreaking concept, 'Family Sensitive Training', which promotes families as partners and active participants in service provision.

'This work continues with a multitude of training forums, consultations and collaborative projects with carer and consumer organisations, facilitated by the Centre's Mental Health Program team and the State's first "Carer" academic position,' says Dr Riess.

A recent development, in a partnership with the North West Mental Health Service, involves research and intensive training for sustainable family therapy throughout Victoria – a project known as 'Building Family Skills Together'.

Other work at the 'extremely challenging' end of family difficulties includes clinical research relating to the impact of acquired brain injury and such highly sensitive areas as family abuse, neglect and associated trauma.

Dr Riess says the Bouverie Centre has never been bound by the constraints of



Minister Pike, centre, and Dr Riess, left, at the recent Open Day celebrating the contribution of the Bouverie Centre.

traditional or conventional practice.

'For example, "Breaking Through" – a unique whole-school approach to combating bullying and homophobic harassment through use of role playing using "Theatre of the Oppressed" (TOTO) techniques – is today nationally and internationally recognised for its innovative use of families, students and teachers to deliver its message.'

In the clinical area, the Centre helped develop 'Single Session Therapy', an innovative approach using limited counselling resources in the most efficient way. Prior to that, repeated therapy sessions were the norm.

As one of the State's earliest child guidance clinics, Dr Riess says the Bouverie Centre evolved through the late 1970s, under the leadership of Dr Geoff Goding, into Australia's first specialised family therapy centre. It began training therapists in the early 1970s.

'This led to a partnership with the Occupational Therapy School at La Trobe, created Australia's first formal academic course for family therapists in 1989, and prepared the way for the Centre's move to the Faculty of Health Sciences in 1996.'

The Centre broadened its role in the late 1990s to help people of all age groups experiencing mental health difficulties.

Working with both government and non-government community health sectors, its innovative ideas in clinical training and service development have helped it win many large tenders over the years.

'Plans for expanded clinical training and research will see further expansion of such collaboration.' ●



Making a difference

Improving the sexual health of Australians with intellectual disabilities – and the lives of post-disaster amputees in places like India ...

Worlds apart, these two studies indicate the breadth of expertise and depth of commitment of researchers in La Trobe University's Faculty of Health Sciences.

In December, the Faculty held its sixth annual research conference, this year on the twin themes of intellectual and physical disabilities, sharing the results of its work with health and human service practitioners and the wider community.

Faculty Dean, Professor Hal Swerissen who hosted the conference, said the research demonstrated how disability impacts on families – and the support some people need for fuller participation and inclusion in society.

The keynote speaker was Arthur Rogers, Executive Director of Disability Services in the Department of Human Services. The Department is one of the Faculty's key research partners.

Professor Swerissen said other La Trobe research dealt with physical activity programs and communication support for people with disabilities, learning disorders, issues facing parents of adults living with Down Syndrome and vocational rehabilitation following traumatic spinal cord injury.

Sex, secrets and desire

'We know nothing about the sexual desires of people with intellectual disabilities because we don't ask them,' says Dr Lynne Hillier and Dr Kelley Johnson from La Trobe University's Australian Research Centre in Sex Health & Society.

In a paper to the conference detailing a joint study carried out with Dr Lyn



One of the works from the exhibition, 'Intimate Encounters', which were featured at the conference. Photographer: Belinda Mason-Loverling.

Harrison from Deakin University, the two researchers presented the reflections of people with an intellectual disability about autonomy, sex, secrets and desire in their lives.

'People with an intellectual disability have historically been the most regulated of groups, but they are rarely asked to comment on this or to talk about their lives.'

The research was based on stories about sex, love and relationships told by 25 people with intellectual disabilities.

'We looked at what happens when a sex life is denied to certain groups by their families, their teachers, their carers and society in general.'

The researchers found that decisions made for individuals in the name of care and protection can often generate serious public health issues for those people.

Case study Gujarat

A La Trobe University study has found that ongoing services for amputees and people with musculoskeletal injuries after a major disaster are more useful than the mobile outreach clinics often set up after such events.

And the clinical skills of staff sent into these areas are more important than technical considerations like the quality and finish of the prosthetic devices they provide to victims.

Wesley Pryor, lecturer at La Trobe University's National Centre for Prosthetics and Orthotics, led a major study of post-earthquake amputees in Gujarat, West India.

He says the findings of the study – carried out in collaboration with Handicap International and local partners in India – reinforced the need for a more coordinated approach to prosthetics care in rapid-response situations.

The study followed one of history's most powerful earthquakes which struck Gujarat, West India, in 2001. The epicentre was Bhuj, a town about the size of Bendigo. About 30,000 people were killed and 100,000 injured.

Mr Pryor says reconstruction after such natural disasters – or after major military conflicts – involves international aid by prosthetists and orthotists who work with local communities providing artificial limbs and other mobility aids.

'Responses to such events are often, understandably chaotic. Multiple agencies arrive. In Gujarat, there were eight different providers of prosthetic services.

'Enthusiasm for helping is often not matched by a coordinated approach or systematic understanding of which interventions are most effective.

'Very often, inappropriate prosthetic devices end up in a cupboard or under a bed. We needed to know how to decrease that by providing appropriate technology.' ●

Young people leaving state care need more support

Young people leaving state care are arguably one of the most vulnerable and disadvantaged groups in society.

‘These people face particular difficulties in accessing educational, employment, housing and other developmental and transitional opportunities,’ says Dr Jennifer Lehmann, a lecturer in Social Work and Social Policy on La Trobe University’s Bendigo campus.

This has been highlighted in a special edition of the *Children Australia* journal, focusing on major questions dealing with young people leaving state care. Dr Lehmann is a specialist in studies of community services management and program evaluation and regular editor of *Children Australia*.

She says studies show that poor outcomes for many children who leave care reflect emotional trauma resulting from abuse and neglect prior to care, inadequate support while in care, accelerated transitions to adulthood and lack of guaranteed ongoing financial and other assistance to help facilitate this transition.

‘Research into young people leaving care indicates that better support and services can lead to better outcomes for care leavers. What is clearly needed is the provision of stable and supportive placements with a positive attitude to education,’ says Dr Lehmann.

Maintenance of links with family members or community supports, a flexible process for graduating from dependence to interdependence, the involvement of young people in the leaving care planning and decision-making process, and accommodation options and ongoing



support are also essential.

‘Strangely, there is little, if any, analysis or explanation as to why governments have failed to provide sufficient resources and assistance to care leavers.’

Dr Lehmann says the journal, based on papers from a recent conference, highlights significant political, economic, and practical barriers to introducing effective leaving care services.

It points out that most child welfare systems are crisis driven. They prioritise the rescuing of children and young people from abuse and neglect, rather than providing support for those already in substitute care or transition from care.

Many policy makers don’t understand, or prefer to ignore, that leaving care is an integral part of the child welfare continuum – and that the state as substitute parent has a legal and moral responsibility to provide ongoing support to care leavers.

Dr Lehmann says a recent report from the Centre for Excellence in Child and Family Welfare has shown leaving care supports are cost effective, reducing later demands on government health and welfare support.

Stories that help to teach

Dr Lehmann is also author of a book dealing with children and families, titled *The Harveys and Other Stories*.

Published in 2003, the book was inspired by her many years experience in social work and contact with the lives of Australians ‘as they approach the sometimes heart-rending challenges of living and relating’.

It was also designed as resource for teachers of social work, education and health, and has proved a valuable tool for human service professionals in general.

As a result, Dr Lehmann’s work in narrative has continued and, in a field where the nature of work and privacy laws often limit what can be told about real cases, she uses fictionalised stories to help teach about child, youth and family services.

In a new book, *Critical Reflection in Health and Social Care*, (by Sue White, Jan Fook and Fiona Gardner, Open University Press, 2006) she has written a chapter ‘Telling Stories - and the Pursuit of Critical Reflection’ on the use of narrative for teaching reflective practice. ●

Bowlers also feel the pain

Next time you wince for the injured heroes of your favourite football team, spare a thought for Australia's Test cricketers, who also suffer for the glory of their game – with batsmen and fast bowlers bearing the brunt of the pain.

They may not offer the gladiatorial spectacle familiar to AFL fans as Big Men fly, tackle and crash, but they do suffer long-term and painful injuries. La Trobe University physiotherapist and former Coordinator of its Master of Sports Physiotherapy course, Alex Kountouris, bears exclusive witness to that.

Recently appointed Australian Team Physiotherapist by Cricket Australia, it is his job to manage the injuries, mitigate the pain, and where possible prevent it – a round-the-clock job when the team is on tour, as it is approximately six months of the year.

A soft job compared with, say, a football physio's?

'It's different. AFL goes for 90 minutes, our matches go for 30 hours – so they go for five days straight,' says Mr Kountouris.

'The perception is "how can players get injured playing cricket?" I can tell you there's not one day where I'm not working six, seven, eight or nine hours a day trying to fix up injuries.

'Players being hit by the ball, they're the obvious ones, the ones people see. The ones they don't see are the sore backs, the tendonitis going on in their shoulders, their knees, their ankles causing pain. The internal injuries you can't see, they're the ones I treat the most.

'Every game there's something going on with most of the players, from sore hamstrings to breaking a bone. The most common is over-use

injury because they're doing the same thing repeatedly, bowlers in particular. Fast bowlers suffer a lot because they can bowl 30 to 40 overs in a couple of days and then take a half-day break and go back and repeat it all.'

The worst thing you have to do is send a player home when on tour.

Seven years as official physiotherapist to the Sri Lankan cricket team and three as back-up physiotherapist to the Australian team before taking up his full-time appointment, Mr Kountouris and his eight suitcases and fold-up table are now a familiar fixture among Australia's touring cricketers.

He loves the job and shares the pain, strain and euphoria of being part of the national team, but when players are injured, he faces some of his toughest calls – whether or not to take them out of the game.

'The worst thing you have to do is send a player home when

on tour. If a player gets injured, you have to make a decision whether the injury will recover in time to continue the tour.'

On a two-year contract with Cricket Australia, Mr Kountouris is continuing his casual teaching responsibilities at La Trobe, lecturing in cricket-related injuries to post-graduate physiotherapy students.

He is also pursuing a research project through the University funded by Cricket Australia to evaluate the link between bowling techniques, muscle asymmetry and stress-fracture injuries in the lower spine among young fast bowlers.

'The hypothesis is that the ones who get stress fractures will have muscle asymmetry. If you're a right-arm fast bowler, the muscles on the right side will be much bigger than those on the left, either because the muscles are trying to stabilise the area, they're overworking, or it's something to do with the player's technique – the way they bowl, or the way they twist their trunk – that's causing that muscle to pull on the bone causing it to break.

'If we can confirm this, we would then hopefully be able to prevent it.'

The work has implications for fast bowlers, gymnasts and tennis players, and because these injuries are common among young cricket players, for how they are coached.

For Ricky Ponting and his Australian team it may be shutting the gate after the horse has bolted – their physiotherapist says most of the fast bowlers would have sustained stress fractures in their youth – but not for the future of cricket.

Because his research seeks to identify risk factors in 13 to 18 year olds, he says it aims to ensure the best bowlers will still be around at the age of 20-plus – with a chance of being selected for the national team. ●

