Researchers in stem cell breakthrough

In a world first, Monash University researchers have discovered immune system stem cells and used them to grow a crucial part of the immune system — the thymus.

For more than 30 years, a major question in immunology has been how to replace a dysfunctional thymus, a small organ just above the heart that is critical in generating many vital cells of the immune system, including infection-fighting T-cells.

In many people, the thymus does not work properly due to ageing, attack by viruses, chemotherapy or genetic abnormalities. When this happens, the body becomes susceptible to infection and death can result.

Now, Associate Professor Richard Boyd and Dr Jason Gill from the Monash University Medical School have identified a small population of cells that can generate a complete and functional thymus.

Their research was published last month in the international journal Nature Immunology.

"There are two major parts to the thymus — lymphocytes and the epithelium," Associate Professor Boyd said.

"It has been known for about 30 years that haematopoietic stem cells had the ability to push, but, until now, we have not known which cells lead to the creation of the epithelium.

The thymus epithelium is vital in the immune system because it has the unique ability of converting haematopoietic stem cells to T-cells. Associate Professor Boyd said.

It also controls the ability of T-cells to recognise foreign invaders and assists in stopping T-cells from attacking body tissues. If there is a defect in the thymic epithelium, then there may be a defect in the T-cells and a greater predisposition to disease.

"The discovery of thymic epithelial stem cells is hugely exciting for us and has taken 15 years of dedicated research," Associate Professor Boyd said.

He said he hoped the research would eventually be used to repair or renew the thymus of people in whom it had been damaged.

"There has been limited success with thymus transplants as they are irreversibly rejected by the recipient, but now we have the possibility of rebuilding someone's thymus after it has been destroyed," he said.

Another promising application could be to use gene therapy to correct gene mutations that lead to thymus problems.

"It might be possible to take thymic epithelial stem cells from a patient, replace a faulty thymus gene with a good copy of the gene, and put those cells back into the patient where they will grow into a healthy thymus," Associate Professor Boyd said.

Penny Fannin
The art of contemplation

Two years ago, every day for more than two months, artist Mary Tonkin would travel to Werribee Gorge in Victoria and spend more than 10 hours sketching the sight that lay primarily with portraiture. 'Rocky Outcrop, Werribee Gorge' was her relationship of intimacy to perceptual which she had worked for more than two months, artist Mary Tonkin research program. She said that up until her thesis travelled to Werribee Gorge in The artist said that up until her before her. Her aim was to record her intimate attempt to capture "the experience of feeling what I felt in that place, but I think I was able to capture it through my drawing." Professor John Redmond, dean of the Faculty of Art and Design at Monash, said he was delighted that a Monash fine arts student had received the national award. "Drawing underpins all quality art and design activity, yet its significance and the skill involved is often underestimated," he said. "I am delighted that Ms Tonkin has been acknowledged at the national level. The award reinforces the worth and value of this type of drawing, as a discipline which we are extremely proud of." Fiona Perry

Aquatic ecosystem studies rewarded

There is barely a stream in Victoria that Professor Sam Lake, from Monash University's School of Biological Sciences, has not examined in his quest over the past 30 years to understand how human and natural disturbances impact on the animals and plants that make up stream communities.

And now his significant contribution to benthic science — the study of the plants and animals that live on lake and stream bottoms and their role in aquatic ecosystems — has been acknowledged by the North American Benthological Society Award (NABS). The centre at a dinner at the Indian High Commissioner Mr Rajendra Singh Rathore launched the Monash India Focus Group at a dinner at Monash's Clayton campus last month.

Visitors to this year's Open Day at Monash University will get the chance to engage in activities which previously would not have been possible," Professor Norris said.

Drivers wanted for road rage study

A Monash psychology honours student researching road rage for his thesis is looking for volunteers to take part in a survey.

Mr James Pett, under the supervision of Dr Nikki Rickard, from the School of Psychology, Psychiatry and Psychological Medicine, is studying the factors that cause people to become angry when they drive. Mr Pett is looking for people aged between 18 and 60, who drive a car at least three days a week, to fill in a questionnaire.

"Anyone interested in taking part should contact Mr Pett on 03 9905 2135 or email jamespett@bigpond.com"

Monash India focus group launched

About 90 secondary students from seven schools attended the event. Ms Kate Ursin of Parktown Girls High School was voted best speaker on the day for her contribution for the affirmative that marijuana should be decriminalised.

Research lab opened

A new $160,000 research laboratory was opened at Monash's Peninsula campus recently by dean of Science Professor Rob Norris.

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Leading the playing field

Monash University will establish itself as a premier sporting organisation, with four new teams to boost the university’s involvement in all things sport over the next two decades.

The move is the latest in a series of strategic developments, which have seen the university form ties with professional sports organisations linked to the Australian Football League (AFL), the National Rugby League (NRL), the Australian Cricket Board and the Australian Tennis Tour. This has just been approved to head up Monash’s swimming. National sporting organisations have also been recognised by state and national sporting organisations as well as top-level sporting clubs.

And the current alliances also provide endless opportunities for staff, students and the community, including possible work placements, linked re- search projects, the potential to attract grants and the development of future course units of direct application to the sports sector.”

Mr Doulton said sport at Monash had the potential to become one of the defining features of the university. “Sport can, without a doubt, help Monash become an even more attractive place to study, work and play, while enhancing its reputation as a leading university,” he said.

“Above all, our intention is to help more Monash people become more active, more often and in more ways.”

Konrad Marshall

Major drug company poised to join Monash science precinct

Drug discovery and development company Biota Holdings has made an in-principle agreement to be among the first tenants in Monash University’s Science, Technology, Research and Innovation Precinct (STRIP), it was announced at the launch of the precinct last week.

Victorian Minister for Innovation Mr John Brumby launched the first of five planned stages of construction for seven buildings in the Monash STRIP. The $300 million Monash STRIP, a $35 million, 13,000-square-metre first building is currently under construction and is due for completion in January.

“The $300 million Monash STRIP will be a magnet for researchers and entrepreneurs, and is designed to support innovation by merging business and industry with academia, to attract scientists which in turn would attract students to the university. “Australia’s chief scientist Dr Robin Batterham said the centre was not just important for Monash but also for Australia. He said expectations were a lot longer work alone on projects but worked best in clusters, bringing together expertise from a range of fields. “That’s where we will get the innovations of the future,” he said.

Vice-chancellor Professor David Robinson said the Monash STRIP would also create an integrated learning environment where academics from different fields would be able to work side by side. “The STRIP will be a place for people to develop their ideas and turn them into a commercial reality that will have huge significance for Australia nationally and internationally,” Professor Robinson said.

Doing business: Victorian Minister for Innovation Mr John Brumby, left, with vice-chancellor Professor David Robinson and deputy vice-chancellor (Research) Ms Allison Crook. Photo Peter Anjikajarko.

“Some of the most exciting developments such as bioinformatics, bioengineering, nanotechnology and environmental science are occurring across disciplines and faculties.”

Development of the STRIP is being led by deputy vice-chancellor (Research) Ms Alison Crook, who said the centre was a part of the university’s strategy to strengthen research and development in Australia.

“We believe the STRIP will be a place for people to develop their ideas and turn them into a commercial reality that will have huge significance for Australia nationally and internationally,” Professor Robinson said.

Mr Doulton said this form of association with top-level sporting clubs is in line with Monash’s reputation and provided opportunities for participation that would otherwise not be available.

“High-quality facilities, strong relationships with sporting partners and close pathways to sporting excellence all help to enhance our ability to further develop sports-related research and education opportunities,” he said.

The current alliances also provide endless opportunities for staff, students and the community, including possible work placements, linked research projects, the potential to attract grants and the development of future course units of direct application to the sports sector.”

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Protest art

Leading Australian performance artist Mike Parr cut a surreal and counter­


troversial figure at his performance, “Close the concentration camps”, at the Monash University Museum of Art last month. Declaring his support for asylum seekers in Australian detention centres, Parr sat for five hours in the middle of an empty gallery with his eyes, nose, and lips taped together and the word ‘alien’ branded into his thigh. About 150 people visited the gallery to witness the performance, while others watched a live webcast of the event via a Monash web page. It was the first live webcast from Monash using the university’s new quicktime streaming server.

Photo Richard Crompton.

Step forward in prostate disease understanding

MEDICAL RESEARCH

Changing ratios of hormones could be responsible for initial abnormal changes in prostate growth, a Monash University PhD researcher has found.

The findings are an important step forward in understanding the elements that lead to changes in the growth of the prostate and how such changes could lead to the development of prostate cancer.

Mr Stephen McPherson, a researcher at the Monash Institute of Reproduction and Development, used specially bred ArKO, or estrogen-free, mice to investigate how altering normal levels of androgens (male hormones) and estrogens (female hormones) regulated prostate growth, which occurs in the normal human aging process.

Prostate cancer is Australia’s second leading cause of male mortality from cancer, claiming more than 2,500 lives annually.

"Nobody is sure how prostate cancer starts. Theories have ranged from hormonal influences, such as over-expression of androgens, to the effects of estrogens or to mutations in growth factors," Mr McPherson said.

But by using the ArKO mice, Mr McPherson said that his research looked at the effects of removing estrogen on prostate growth rather than the effects of adding extra estrogen to it.

The ArKO mice, which don’t make estrogen, have abnormally elevated androgen levels, which Mr McPherson said researchers believed were selecting the prostate.

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or email monashnews@adm.monash.com.au

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**Wireless IT to ease home-office isolation**

Students and their families from regional areas and interstate who do not have the time to visit Monash University during Open Day can do so in the school holidays as part of the Explore Monash program. The free program includes a brief talk about the university, with an opportunity for visitors to ask questions and take guided tours of the campus.

Students and their families can also talk with faculty representatives and current uni students, and can eat areas of academic interest to be included on the tour.

The next Monash Explore Monash session will be held at the Gippsland campus on Tuesday 24 September from 10.30 am to 2 pm. Bookings are essential.

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**INFORMATION TECHNOLOGY**

Students walking through Monash Sport arena on August 7-8 and 9-10 in both regional areas and interstate who do not have the time to visit Monash University during Open Day can do so in the school holidays as part of the Explore Monash program.

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**Net benefits for business in e-research**

A Monash University marketing academic has identified what could be the key to successful online trading.

Dr Chris Dubelaar, a senior lecturer in the Department of Marketing, believes one of the most significant obstacles confronting e-commerce today is consumer trust - a recent US survey that found nearly 70 per cent of web merchants who had identified played a significant role.

"There is a dearth of research on the implications of trust in online transactions, but it is clear that trust is essential for successful online trading," Dr Dubelaar says.

"People are very reluctant to offer personal details to online organisations, and this is often a major obstacle to online trading."

The survey showed that the biggest drive to shop online was benefit delivery, followed by price discounts, willingness to rectify, a privacy statement and good delivery times.

"Privacy is still one of the critical stumbling blocks that face firms trying to access a head organisation's network often have to go through low-bandwidth connections that are unreliable and slow," Dr Dubelaar said.

"Even using cables in high-bandwidth networks can be too expensive for businesses and, depending on the number of users, may still not provide the quality of service people expect and receive in the workplace."

"Using wireless technology enables us to bring the benefits of high bandwidth into homes and commercial settings without the need for additional expense."

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IT IS TIME Australia recognised the necessity of introducing a national scheme that provides women with paid maternity leave.

Most advanced countries have compulsory paid maternity leave and, by the end of this month, Australia and the US will be the only two OECD members not providing some form of national maternity leave scheme.

The view that having children is an individual decision and therefore the individual should bear the cost is very shortsighted.

It does not recognise that in Australia today (a) most families with young children require both parents to remain in the paid workforce and (b) the traditional family structure of a male breadwinner in a single-earner household with dependent children only applies to one in six Australian households.

However, the traditional family structure remains a stronghold on popular aspirations and underpins the basis of many of our social policies and business organisations.

It is time we recognised the transformation of family structures and developed sensible social policies that reflect the real situation.

We also need to take account of changing demographics and inequalities in the current system.

Australia's total fertility rate today is below replacement rate and raises serious concerns for the workforce 30 years from now.

Currently, one-quarter of Australian women have access to paid maternity leave, and most women receive less than 12 weeks' paid leave.

The need for maternity leave is also likely to be available to women in professional jobs and not to women in non-professional or female-dominated industries.

Negotiated agreements are certainly not the answer. The available evidence demonstrates that paid maternity leave provisions in enterprise agreements are rare — they are currently provided in less than 6.7 per cent of operating collective agreements and 10 per cent of Australian Workplace Agreements.

A national policy, however, would have the potential to broaden the availability of maternity leave to all groups of women.

There is a range of schemes that could be introduced, but the funding model must protect the interests of women, employers and taxpayers.

Countries that currently offer maternity leave schemes provide for between two and six months' leave, paid at 80 to 100 per cent of a woman's previous earnings. The schemes ensure women are not pressured to return to work early and compensate them for any workplace disadvantage experienced due to time away from work.

For these reasons, the International Labor Organization does not support a funding model for a paid maternity scheme in which individual employers are directly liable for payments. Very few OECD countries require employers to be solely responsible for funding maternity leave agreements with a 12-week government payment at a minimum rate.

Prime Minister John Howard recently ordered the public service to provide detailed costings and options on paid maternity leave schemes.

“IT IS TIME we recognised the transformation of family structures and developed sensible social policies that reflect the real situation.”

For the reasons outlined in the Valuing Parenthood Report, which outlined a number of different funding models for paid maternity leave, the federal government must introduce a national paid maternity leave scheme to encourage more women to start families.

The opposition leader Simon Crean has promised Labor would introduce a national paid maternity leave scheme if elected, while the Democrats are proposing replacing all existing maternity leave agreements with a 12-week government payment at a minimum rate.

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Shakespeare classic parallels modern life

A tale about a husband starving his wife in order to tame her may seem of little relevance to audiences living in a post-feminist world. But according to Mr Des James, director of the Bell Shakespeare production of The Taming of the Shrew, to be performed at Monash University this month, the play has many parallels to modern life.

"While Shakespeare's satirical look at courtship and marriage presents some interesting tensions for audiences today, particularly with the sub-theme of Katrinia (the wife) at the end of the play, The Shrew does resonate with eternal conflicts that exist in every relationship," he said.

"Regardless of the play's historical context, this battle of wills is the most enduring aspect of the play for modern audiences and one that I have encountered a lot. Katrinia was a character who would have been familiar to women in the Elizabethan era," he said.

Mr James said the character of Katrinia was, in fact, very contemporary and one many women could identify with.

"Today we live in an era of feisty, independent women. It goes with the territory. Ken's 'tame with a fist' behaviour is unusual in an Elizabethan context but so familiar to women today," he said.

"For example, the tensions arising from a woman's desire to fulfill her full potential in a male-dominated world, particularly in terms of career and education, or just preserving one's identity and independence in terms of relationships and family is very much alive in any society."

The production, which has a cast of nine, borrows from many contemporary and familiar popular cultural forms but, says Mr James, the words remain Shakespearean.

The season of The Taming of the Shrew at Monash is being sponsored by the Monash School of Business. Professor Flitman said the innovation and the aspect of the play for modern audiences and one that I have encountered a lot. Katrinia was a character who would have been familiar to women in the Elizabethan era.

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Professor Andrew Fitzman, head of the School of Business Systems, said supporting the play was the latest in a series of sponsorships which have included concerts by the Monash Symphony and the Asian Youth Orchestra and a Bell Shakespeare production of The Tempest.

"It is important that a successful school like ours recognizes its place in the wider community and is able to make a significant contribution," he said.

"We are also able to use the sponsors to showcase innovations with the school, and we will be launching our new Masters of Business Technology during the season of Cyphershine, the second show we will be sponsoring this year."

What: The Taming of the Shrew
When: 19 to 22 July
Where: Monash University Theatre, Clayton campus
Who: For more information, contact the contact +61 3 9905 1111.

Derek Brown

A step into the blue for emerging Australian artists

An exhibition of work by six emerging artists from around Australia is on show this month at the Monash University Museum of Art (MUMA) at the university's Clayton campus. Featuring new and recent pieces by Nadine Christensen, Gareth Donald, Sarah Elson, Cherie Pahl, Jo Grant and Robert Pullie, Into the Blue is an exhibition which MUMA senior curator Ms Linda Michael hopes will highlight the nation's diverse artistic talent.

In 2000, Ms Michael received a grant from the Australia Council to travel around Australia looking at artists' work. This exhibition, she says, is just one of the many potential shows the trip inspired.

"During my travels I visited artists in many Australian cities and saw a great deal of interesting work. I thought it would be worthwhile to put together a show that brought some of these artists together," she said.

Into the Blue includes pieces by artists working in Perth, Brisbane and Sydney, giving Melbourne artists an opportunity to see works by artists from around Australia.

According to Ms Michael, the exhibition is held together more by a theme than other artistic media because a broader visual arts.

Artistic media explored in an exhibition include screen-based work, drawings, prints, installations and ceramics. For more information on the artist-in-residence program, visit the faculty gallery index at www.artdes.monash.edu.

Exhibition stirs digital imagination

Computer graphics, laser projection and digital manipulations are among the ultra-modern artistic media explored in an exhibition at the Monash Faculty of Art and Design Gallery from 8 July to 4 August.

The exhibition, The Synthetic Image, features the works of 13 Australian artists, including staff from Monash's Department of Multimedia and Digital Arts. Exhibition curator and contributor Mr Vincent Dziekan, from the Department of Multimedia and Digital Arts, said the idea was to set up the gallery as a space for digital art in Australia.

"This will allow the works that are based on digital imaging in a traditional gallery presentation format, with another space set up as a dark room for projection of more immersive, screen-based work," he said.

According to Mr Dziekan, the digital image generally incites a different type of involvement from the viewer than other artistic media because a degree of interaction is required.

"In one of the works, involvement extends to the viewer's ability to physically touch the image, by arranging on-screen elements to alter different types of sounds," he said.

Interaction with specific works of art is just one way in which Mr Dziekan hopes the exhibition will show the vibrancy and vitality of digital art in Australia.

He said the digital image was no longer confined to alternative art spaces and that traditional institutions were increasingly bringing new media into the fold.

"Within the arts, the notion of new media has been on the agenda over the last decade or so, and I think people are becoming more comfortable with that kind of work," he said.

"The 'real' world carried on along for a while, but the art community has got over that to a degree. I hope the exhibition will show that the work people are doing is pretty topical in terms of the broader visual arts.

According to Mr Dziekan, some of the artists created their works on computers using conventional software like Photoshop or wrote their own software to create the images, using a computer as a director to digitally manipulate photos.

People still get that shock when they look at the images because they don't know how they were created or fabricated, so there's a wonderful sense of mystery and magic in the work."

What: The Synthetic Image
When: 8 July to 4 August
Where: Faculty of Art and Design Gallery, Caulfield campus
Who: For more information, contact the contact on +61 3 9905 2707.

Konrad Marshall

Making their mark: Emerging artists show their diversity in the latest exhibition at the Monash University Museum of Art.
Attacks on judiciary pose danger to independence

Recent unjustified attacks by politicians on High Court judge Justice Michael Kirby and on the Federal Court have exposed the perceived trend of a growing disrespect for the judiciary, according to Monash constitutional law expert Professor H. P. Lee.

"There is the danger of an erosion of the independence of the judiciary if these constant and unjustified attacks are maintained," he said.

"For the rule of law to prevail, there must be a clear separation between the judicial, executive and parliamentary arms of government. The rule of law and social cohesion depend on the confidence of the public in a very impartial and independent judiciary."

Judicial independence is one of the many issues explored in a new book, The Australian judiciary, recently released by Professor Lee and co-author Monash Emeritus Professor Rolf Campbell.

The book sheds light on one of the most important, and yet possibly most misunderstood, institutions in Australian society, covering its history, training, work, techniques, problems and future.

The book is aimed at a broad audience of national and international scholars, judges and legal practitioners, as well as the layperson who is interested in knowing more about the workings of the judiciary.

Professor Lee said that in the face of unfair attacks on the judiciary, it had traditionally been the role of the Federal Attorney-General to defend judges.

"However, the current Attorney-General has publicly disowned that role - he was conspicuously silent when Justice Kirby was publicly vilified by Senator Bill Heffernan, and it was the Federal Court itself who called upon the National Herald to account for his comments against the court," Professor Lee said.

Exhibition reveals artists at play

Challenging the stereotype of the solitary artist working in isolation, a collective of Melbourne artists, including two Monash staff members, have turned to each other for inspiration.

Ms Geraldine Burke, a lecturer in Monash's Faculty of Education and one of four artists who make up Refluxus, said the group produced art through a collaborative process that focused on the interplay of artistic discovery.

The Refluxus collective, which also includes artists Ms Pamela Irving, Ms Maria Luisa Nardella and Ms Heather Shimmen, has been together for six years and has worked on more than 20 shared projects, some of which will be on show this month in an exhibition at the Bendigo Art Gallery.

Ms Burke said the artistic process used by Refluxus was originally inspired by a game of 'papier mou', or paper scraps, from early last century called 'exquisite corpses', which was used by the surrealists to create collaborative art.

"In exquisite corpses, a piece of paper is passed around the room and different people have to draw a head, a body or legs without seeing what the others have drawn, thereby creating unusual compositions," she said.

"The surrealists used this game to undo the more taboos of the time and subconscous aspects of their creativity, and we are expanding on that process in our work. However, we have placed the game in a contemporary context. Our artwork responds to current issues and often utilises the image of everyday life.

Projects on show at the exhibition include the 'Freaky Fridge' project, in which oversized fridge magnets with images on them are arranged on fridges located around the gallery. People visiting the exhibition are encouraged to interact with the magnets to create new designs.

Another project titled 'This is Not a Domestic Object' includes 50 rolling pins, which have been transformed using digital images, paint and a number of other objects, into humorous parodies far removed from their original functions.

Playful: Members of Refluxus, from left, Heather Shimmen, Pamela Irving, Maria Luisa Nardella and Geraldine Burke have fun with their art. Photo Greg Ford.

Ms Shimmee, a sessional teacher in the School of Psychology at the University of Luton in the UK, has been a professional artist for 25 years.

Ms Burke said the group's work has a deeper meaning, a parodic use of the everyday.

"We've come up with something unique which oversized fridge magnets with images on them are arranged on fridges located around the gallery. People visiting the exhibition are encouraged to interact with the magnets to create new designs.

Another project titled 'This is Not a Domestic Object' includes 50 rolling pins, which have been transformed using digital images, paint and a number of other objects, into humorous parodies far removed from their original functions."

"It was a very unusual step for the court to take, because the danger of the court defending itself is that it could bring about a possible confrontation with the executive arm of government. In such circumstances, judges can lose their independence being questioned," he said.

"When the Malaysian judiciary and Prime Minister Mahathir had a confrontation, the top judge of the land and two senior Supreme Court judges were removed. This is a situation we want to avoid at all costs in this country."

Fiona Perry

The Federal Court example showed that in the absence of a defense mounted by the Attorney-General, a court would not remain inactive where there was a danger of its independence being questioned, he said.

Questioned: Judicial independence is explored in a new book by Monash law expert Professor H. P. Lee. Photo Newspix.

Reshaping Life

Third edition

Key Issues in Genetic Engineering

By Gustav Nossal and Ross Coppel

Published by Melbourne University Press

RRP: $34.95

As scientific technologies grow more powerful, people are becoming more and more concerned about the implications of reproductive, cellular, DNA and gene research generally. With much of the technology used in these areas being rushed into widespread use, there is little time for debate or public education.

This book outlines the key issues of modern biotechnology in a simple yet authoritative way, discussing some of the implications both for scientists and for society.

Reshaping Life addresses questions such as who should decide what constitutes an embryo, or safe, experimental, and how our ability to manipulate life affects our perception of our place in the universe.

Ross Coppel is professor of microbiology at Monash University and director of the Victorian Biotechnologies Consortium. Sir Gustav Nossal is a former director of the Walter and Eliza Hall Institute and chairman of the Strategic Advisory Group of Experts of the Vaccines and Biologicals Programme of the World Health Organisation.

Transitions Between Contexts of Mathematical Practices

Edited by Guido de Abreu, Alan Bishop and Norma Presmeg

Published by Kluwer Academic

RRP: $160.00

This book focuses on what mathematics learners who are moving either constantly, or permanently, from one educational context to another, from one level to another, or from one culture to another. The book offers both empirical studies and significant theoretical reflections from a socio-cultural perspective, with the aim of providing the bases for the development of more socially and culturally responsive mathematics learning environments.

It will appeal to researchers and postgraduate students in the fields of mathematics education, cultural psychology, multicultural education and indigenous education.

Alan Bishop is professor of education and associate dean in Monash University's Faculty of Education. Guido de Abreu lectures in the Department of Psychology at the University of Luton in the UK, Norma Presmeg is a professor in the Department of Mathematics at Illinois State University in the US.
New theory could help identify diseased tissue

A theory describing how X-rays scatter has been developed by Monash University physicists which could have implications for identifying diseased human tissue or detecting flaws in industrial materials.

The team, led by Dr Konstantin Pavlov and Associate Professor Michael Morgan from the School of Physics and Materials Engineering, has developed a mathematical theory that describes X-ray diffraction tomography (XDT). XDT has been in development for more than 10 years, but its progress has been hampered because scientists have been unable to accurately describe the way X-rays scatter once they have struck the material being imaged.

But Dr Morgan and Dr Pavlov, with PhD student Mr Cameron Kewish, have solved this problem with their mathematical theory that describes exactly how incoming photons, or X-rays, interact with the atomic electrons of the material. Until now, a process called X-ray computed tomography (CT) has been routinely used in clinical medicine and industry to image the structure of materials, but it is thought that XDT could produce more valuable images.

"Whereas conventional CT produces a map of density, XDT shows structure and chemical composition," Dr Morgan, deputy director of the university's Centre for X-Ray Physics and Imaging, said.

"Two materials could have the same density but a different composition, and XDT will allow us to image these differences."

The theory developed by Dr Morgan and his colleagues allows them to reconstruct what happens when X-rays interact with materials such as bone or wood. According to Dr Morgan, XDT could be used to identify cancerous tissue by measuring the scatter profile of the tissue and comparing it to non-diseased tissue.

"Standard radiographs produce a map of density, but the XDT technique shows the ordering of atoms in a material," he said.

"Once we understand ordering at the molecular level, we can get a better understanding of the progression of diseases such as osteoporosis."

State-of-the-art facility: A synchrotron such as this was used to test the XOT theory, which could help identify diseased tissue.

International synchrotron expert joins Monash

Australia's first professor of X-ray and synchrotron physics, Rob Lewis, has arrived at Monash University with plans to continue his world-class research into how X-ray techniques could be used to improve the early diagnosis of breast cancer.

Professor Lewis is an internationally recognized expert in synchrotron science who has been investigating how synchrotron radiation might be used as a 'gold standard' for medical imaging.

He has 22 years' experience in experimental X-ray physics and has led the X-ray imaging detector group at the Daresbury synchrotron radiation source in the UK for several years.

Deputy vice-chancellor (Research and Development) Professor Peter Darvall said Professor Lewis's skills as a science advocate and his enthusiasm in promoting how synchrotrons could be used would be invaluable for both staff and students.

"Synchrotrons produce beams of intense light that can reveal the microscopic structure of materials from proteins to wood. Australia's first synchrotron is to be built on part of an 11-hectare site at Monash University's Clayton campus, with site preparation works beginning in September."

"The unprecedented precision of synchrotrons makes them invaluable tools for designing new drugs, manufacturing new-age materials and making micro-machines, Professor Lewis said.

He said synchrotrons had become an essential piece of infrastructure for many areas of science and that synchrotrons could ultimately be used to develop techniques that would allow cancers to be detected without the need for biopsies.

"Clearly, being able to tell if tissue is malignant simply from a CT image would be enormously useful," he said.

"There is a wide range of applications covering industrial and medical areas, but my particular interests at present are detecting early signs of osteoporosis, being able to visualize carriage damage and improving the sensitivity and specificity of mammography."

X-ray expert: Monash's new professor of X-ray and synchrotron physics Rob Lewis will play an integral role in the Australian synchrotron at Monash. Photo Greg Ford.

Mabo — social justice or political failure?

The Mabo decision had failed to deliver equality to the Indigenous community in Australia, deputy leader of the Australian Democrats Senator Aden Ridgeway told the audience at Monash University's annual Castan Centre for Human Rights Law Lecture.

During his lecture, which marked the 10-year anniversary of the Mabo decision, Senator Ridgeway explored the Mabo legacy and broader contemporary issues of reconciliation, land rights, human rights and social and economic security.

"The hopes of many Indigenous people were dashed when it became evident that the potential of native title to provide equal respect for their cultural heritage could not be realised," Senator Ridgeway said.

"We did end up with a Native Title Act, its amendment after the 1996 Wik decision has rendered it non-beneficial in its effect on Aboriginals by licensing governments to racially discriminate against the interests of Indigenous peoples.

It has been a spectacular failure in delivering on its promise — 30 determinations in 10 years and 500 claims still unresolved." Senator Ridgeway said one of the major hurdles towards reconciliation was government attitude to Indigenous affairs.

"Recognition has only ever been partial, and then given begrudgingly and in a compromised form," he said.

"Leadership has been more for form in the law than it has in parliament because at least the law has remained 'colourblind' in recognising Indigenous rights."

Diane Squires

Seeking equality: Senator Aden Ridgeway presents the annual Castan Centre for Human Rights Law Lecture, hosted by Monash's Faculty of Law. Photo Joe Mann.

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* Graham Distribution Survey, Employers' Careers Council of Australia

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Editors: Bronwen Gourley, Jon Williams

Editorial enquiries: Fiona Perry +61 3 9905 2452

Fax: +61 3 9905 2977

Email: monashnews@adm.monash.edu.au

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