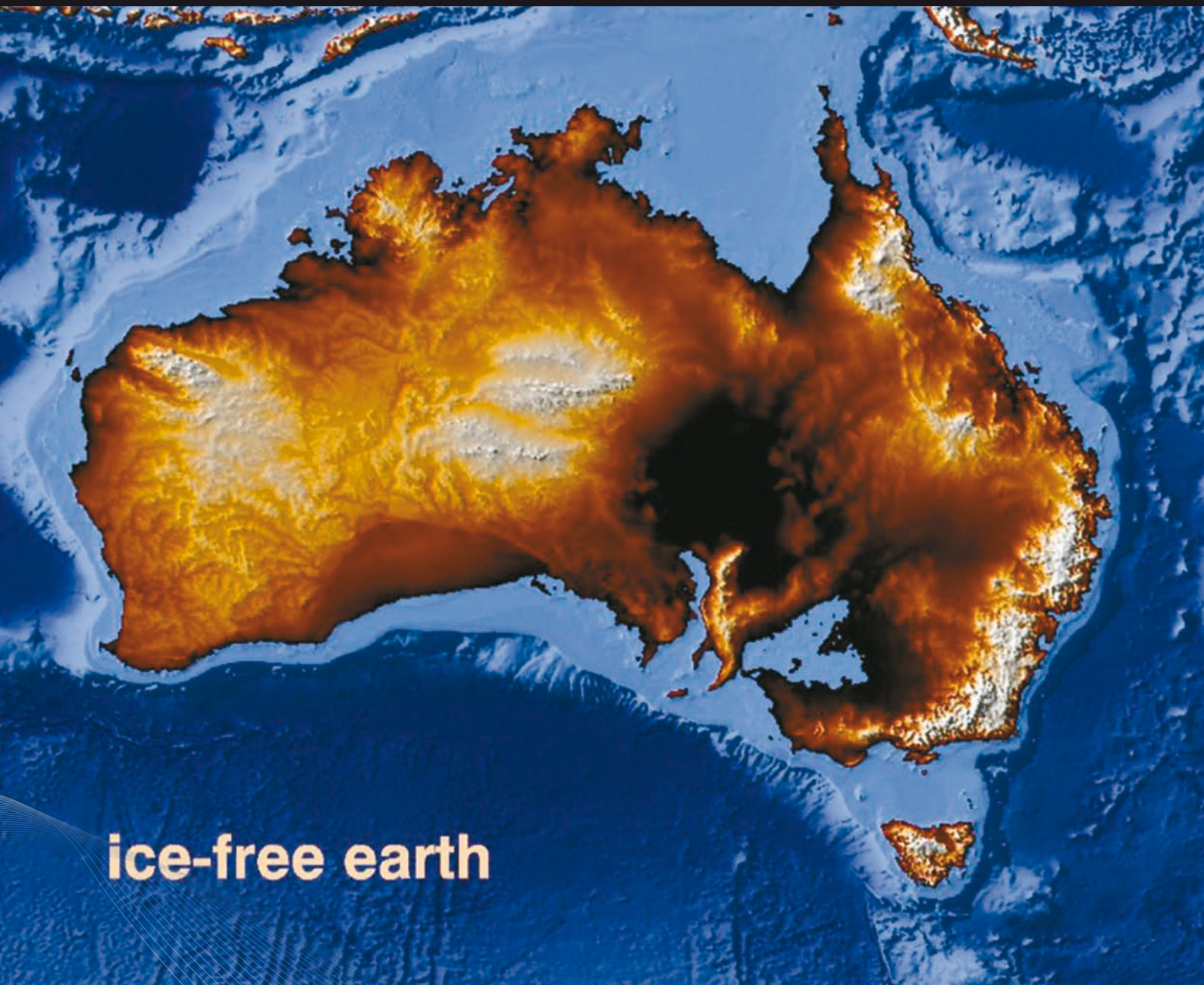


SCIENCE MATTERS

Vol.2, No.2 September 2007



ice-free earth

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Science Matters

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For 154 years we have been the University OF Melbourne. This city and its people have been a source of life for the University. While not reflected in our name, we have also been a University FOR Melbourne, Victoria and, increasingly, the world beyond. The University contributes to the life, the culture and the intellect of the broader community. The words OF and FOR underpin the spirit of knowledge transfer, the determination to build strong, lasting relationships that are mutually beneficial. The University is committed to drawing from its community while simultaneously contributing the fruits of its research and educational experience.

In this issue of Science Matters, there are several examples of the ways in which the staff and students of the University have been working with the community, giving definition to the concept of knowledge transfer.

- Shane Huntington speaks from a wealth experience about the basis for effective communication about science with the community
- We investigate the work of Derek Russell and members of CESAR working within an international consortium to protect crops in the developing world.
- Leading international science writer, Matt Ridley presents his ideas on the Nature – Nurture controversy before a large audience at the Melbourne Town Hall, arguing that nature and nurture are linked.
- David Karoly speaks about global climate change and his role in working within an international team to prepare the landmark IPCC report.
- We travel deep beneath the surface of the Pacific Ocean with Janet Hergt and a team of Japanese submariners, pursuing answers to unresolved questions in geology.
- The winners of the University of Melbourne – Herald Sun Schools Science Journalist competition provide fresh perspectives on science.
- Science Journalists from around the world visit the Bio21 Institute

Professor Peter Rathjen

Dean of Science

Photo of Prof Peter Rathjen: David Hannah.

Transmitting science to the community



SHANE HUNTINGTON

After more than a decade of radio broadcasting, I find that I am more passionate than ever about the growing need for good science communicators to facilitate the interaction between this crucial community and the business world. There is a desperate need to bridge the gap that exists and drive forward Australia's technology excellence.

Communication is much more than being able to rattle off a series of comments relating to some prepared powerpoint slides. It requires a deep understanding of the driving forces behind the audience. The arrogant notion that "my work is so important that they will listen" is deluded and ultimately self-defeating.

There is an increasing pressure for researchers to interact with the rest of the community, both financially and intellectually. The question we must ask at this point is, are they appropriately equipped to do this?

Having interviewed more than 500 researchers over the last 10 years I would have to answer, "not really". This is not a criticism of researchers, but an observation that a training gap exists that needs to be resolved. Typically, researchers are provided with little or no formal instruction on how to communicate to non-science audiences. So

Communication... requires a deep understanding of the driving forces behind the audience

it's critical that we all drop the expectation that they will all be good at it.

Radio is an excellent vehicle for training people to communicate. I'm often asked, "how do you describe things to people without some sort of visual media?". The answer to this is simple, we have the best visual media we could hope for, the listeners' imagination. It's like reading a book without pictures, we all do it, but we never doubt that there is a definite skill involved in a well written novel.

Consider for the moment the radio audience. In our case, we have a range of people who listen. Children, parents, non-science professionals etc. To communicate ideas to such an audience we need to utilize the fact that most people in society have a series of common experiences. That's the canvas you have to deal with. Go outside of that and you had better expect that you will start to lose people very rapidly.

Communicating with business is a walk in the park in comparison.

So what is to be gained by researchers if they follow this path of interaction with non-science groups? Every time you learn to communicate to a new group you improve your generic communication skills. This has immediate application for scientists. Whether writing a grant or

teaching 300 first year university students maths, an enhanced ability to see things from the audiences' perspective is of immense value.

Personally, I write better grant applications and am a better teacher as a result of embracing a passion for communicating science. Above all, I've learned that even with more than a decade of experience communicating science to the general public, I still have a long way to go. As do we all.

Dr Shane Huntington is the NANO Analyst within our School of Physics. You can listen to him on the Einstein A Go Go radio program on Sundays, 11.00am-12.00pm, Triple R radio 102.7FM.

Melbourne University Up Close podcast series

www.science.unimelb.edu.au/community/media/podcast.php

Melbourne University Up Close is a fortnightly audio talk show about research, personalities and cultural offerings at the University of Melbourne.

Dr Shane Huntington (School of Physics) is our host for episodes on the Sciences, Health Sciences, and Engineering.

Episode 12 : War Against the Cotton Bollworm

Our guests for this episode are:

Associate Professor Phil Batterham, Bio21 Institute, and CESAR

Professor Derek Russell, Department of Genetics, CEASAR, and NRI at the University of Greenwich (UK)

"It's mind blowing that the annual cost of a pest could be 5 billion dollars and that a few million dollars is not expended one off to really look for long term solutions." - Assoc Prof Phil Batterham

Episode 16: The Leap from Frogs to Plastic Solar Cells

Our guest for this episode is Professor Andrew Holmes, an ARC Federation Fellow and the inaugural VESKI Fellow at the Bio21 Institute.

"What about shining light on the plastic? And getting electricity back out from it? And indeed it is possible." - Prof Andrew Holmes

Schools Science Journalism Competition: the prizewinners



Earlier this year we joined forces with the Herald-sun newspaper to create the Science Journalism Competition for primary and secondary school students.

The competition had three categories: grade 5-6, year 7-8 and year 9-10.

Grade 5-6 students were invited to write an article of no more than 300 words about the work of an Australian scientist.

Year 7 and 8 students were invited to write an article of no more than 500 words about a big scientific issue.

Year 9 and 10 students were invited to write an article of no more than 500 words on the impact of science on society.

We are really excited about the quality of entries and choosing winners proved quite difficult. The future of science in Australia is bright, judging by the interest and insights of our students.

We are proud to print the winning entriels for each category in this issue of *Science Matters*.

GRADE 5-6 CATEGORY

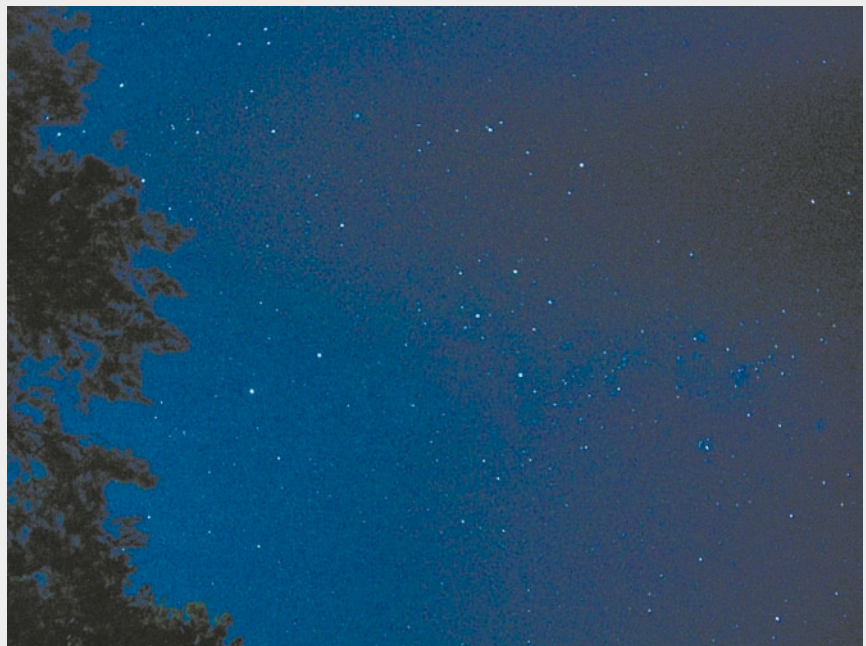
NEWSPAPER OF THE YEAR
THURSDAY, MARCH 22, 2007
CITY SUNNY. MAX. 33 \$1.10

"The sky is growing!" exclaimed Dr Brian Schmidt, one of our Australian astronomers at the Research School of Astronomy and Astrophysics at the Australian National University. Dr Schmidt researches exploding massive stars called supernovae. He uses them to measure distances.

With his team of scientists they found that when a supernova explodes it is about 10,000 to 20,000 degrees centigrade! (This is very hot.) They worked out that supernovae are moving away from us and this means that the universe is expanding fast. Scientists used to think that the force of gravity was slowing the universe down but now Dr Schmidt and his team has proven that there is a type of energy called 'dark energy' which is causing the universe to expand.

For this six-year research project he won the 2000 Malcolm McIntosh Prize.

Dr Schmidt was born in Montana in the United States. His love of science he got from his father, who was a biologist. His teachers encouraged his interest in astronomy and made him challenge himself often. Dr.Schmidt got two Science Degrees at the University of



The Australian sky. Photo: Jamie Stevens.

Arizona and then he did a PhD in Astronomy at Harvard University, Boston.

In 1992 he married an Australian and migrated to Australia in 1994. At the moment Dr. Schmidt is working on a project to build a new Telescope which will map the southern sky. This is called the SkyMapper. The SkyMapper scans the night-time sky and captures the sights that a human eye

can't. This allows astronomers to study everything from planets and asteroids to objects further away. Through Dr. Schmidt's passion for science he hopes to encourage and excite Australians about what science can do for Australia and why they should be loving science.

Zelda Perry
 St Mary's School, Malvern

GRADE 7–8 CATEGORY

BRAVER NEW WORLD IS BIOTECHNOLOGY THE KEY TO A BRIGHTER, MORE EFFICIENT FUTURE?

Thousands of years ago, when the people of the ancient world discovered selective breeding, yeast and the wine fermentation process, the first benefits of biotechnology were realised, albeit unknowingly. Today, biotechnology has advanced to a stage where it has the capability to change our world forever, in the fields of agriculture, medicine and industry.

Though many remain sceptical about the potential of biotechnology, the fact remains that this ancient science could revolutionise the way we live today. Biotechnology refers to the study of biology (the study of living things) in relation to agriculture, pharmaceuticals, and industry.

Today, biotechnology involves the study of, and modification of genes through recombinant DNA technology or genetic engineering, and the creation of genetically modified organisms. Biotechnology has been developing ever since its conception, but in recent times its achievements have been greater than ever before. Genetically modified organisms such as Bt (*Bacillus thuringiensis*) cotton, corn and potatoes are now pest resistant and have all been approved for consumption in many countries. Also, many medical

break-throughs have been achieved, with researchers discovering genetic pre-dispositions to depression and developing an anti-cancer drug which was approved for use in 2004.

Regardless of these and other revolutionary discoveries, the fear remains that biotechnology is not only unnatural, but also dangerous and unpredictable.

Opponents' reservations relate to the consequences of genetic modification, especially hybridization, which could lead to altered species of plants and animals being released into ecosystems and proving lethal to natural species.

In a recent speech given at the University of California, physicist Freeman Dyson suggested that though biotechnology has great potential and creates a world of exciting new possibilities, it still equates with unpredictable outcomes. By the next century will everyone own a DIY biotechnology kit, to create their own pets and flowers? Dyson believes this is a real possibility and claims that the 21st century will be the century of biology.

Before society accepts biotechnology, it needs to lay down firm moral boundaries that will not allow the abuse of its potential

However, is society ready for the possibility of people having the ability to play God? Biotechnology raises many ethical considerations and society needs to decide

when genetic engineering and modification cross the line between science and morality. Before society accepts biotechnology, it needs to lay down firm moral boundaries that will not allow the abuse of its potential.

The prospect of a future dominated

by biotechnology and genetic modification is an exciting, but worrying one. Multinationals investing in a genetically modified future, present biotechnology as a way to alleviate world hunger, through drought resistant, vitamin-enriched crops, and point out that by creating pest resistant plants there will be no need for the pesticides that are damaging the environment. However, the problem remains that no one can be absolutely certain what the effects will be. Only one thing is certain, the world should prepare for biotechnology because, this is its century.

Danae Andreopoulos-Malikotsinas
Camberwell Girls Grammar School

GRADE 9–10 CATEGORY

Have you ever wondered how different the world might be if there were no mobile phones, plasma televisions, jumbo jets in which to travel vast distances, faster cars every year and an increasing array of gadgets to help us in our daily existence? Have you ever thought of what might happen if there were no emergency departments equipped with the latest technology, no heart valves, replacement joints or other life-saving devices to give us greater quality of life, no vaccines to prevent the spread of illness, no means of procreating except naturally?

It is easy to see that science has helped us to reach the stage of technological development that we are at today. For example, the discovery of the earth revolving around the sun by Copernicus inspired others to look beyond our own planet, to discover new things in space and to even put men on the moon. The exploration of the atom by Ernest Rutherford has led to a wealth of developments at the micro level.

Other discoveries have pushed the boundaries in fields such as medicine, health, technology and architecture.

Perhaps science's greatest contribution is that it has not only given us the tools to increase our theoretical understanding of the way the world functions but also the practical means of addressing major problems.

Through that understanding and its practical application, we are now in a position to consider how to deal with difficult issues such as global warming, environmental destruction, lack of water and large-scale starvation in less developed parts of the world.

Moreover, science has had an impact that goes beyond simply providing new technological discoveries and opening up new fields of research. It has changed the way our world functions and, through this, the way we perceive the rules and regulations that govern our lives. Because of scientific discoveries and the enhanced understanding they bring, we have moved from a society of hunter-gatherers to one with advanced levels of knowledge and insight in which it seems that we can almost achieve anything. Thus, for infertile couples, access to in vitro techniques can alter their prospect of having children. DNA codes and

the information they provide open up a world of possibility in terms of fighting disease. Advanced warning systems available through web of satellites provide the prospect of avoiding the destruction caused by natural phenomena such as massive tsunamis. Overall, therefore, science has had an impact on our society and the way we live that is so large we sometimes do not even stop to think about its presence. We take for granted the things it provides and its capacity to seemingly address all problems and issues.

The next great scientific challenge may well be to look critically at the way science permeates our existence and to question the direction in which it is taking us. In that way, we may be able to take best advantage of scientific advance while also protecting the ethical basis of the society in which we function.

Lauren Oster
Melbourne Girls Grammar School



David Karoly has debated climate change scepticism all over the world, including Oklahoma University. Photo courtesy of the OU student paper, The Oklahoma Daily.

The work of climate change

BEHIND THE POLITICS OF CLIMATE CHANGE, SCIENTISTS ARE WORKING TIRELESSLY TO INFORM POLICY MAKERS AND RESEARCHERS ALIKE.

Professor David Karoly, a 2007 Federation Fellow, arrived in the School of Earth Sciences in May and immediately hit the ground running. "It's great to be back in Melbourne after more than four years at the University of Oklahoma" David said. As one of the world's leading climate scientists, he brings to the University a breadth of knowledge of all things climate related. He also has a bubbling enthusiasm for the science, as seen recently on ABC TV's Great Global Warming Swindle panel discussion on July 12th. Calling himself a skeptic, and noting that all good scientists are indeed skeptics, David vigorously defended the science behind the conclusion that humans are having a marked effect on the Earth's climate.

That conclusion has been reached through the tireless work of over 2000 scientists who contributed to the latest report of the Intergovernmental Panel on Climate Change (IPCC). The IPCC was set up by the United Nations and World Meteorological Organization in 1990 in order to provide independent scientific advice on the issue of climate change. Every 5-6 years the IPCC commissions an assessment report to be prepared by the leading scientific experts in the field. The 4th Assessment Report, which is currently being released, finds that 'most of the observed increase in global average temperatures since the mid-20th century is very likely due to the observed increase in anthropogenic greenhouse gas concentrations'. It also finds that a discernible human influence can be detected on every inhabited continent. Professor Karoly has been involved in

the IPCC process from its inception. The 2007 report is actually a series of reports prepared by three Working Groups: I) The Physical Science Basis, II) Impacts, Adaptation and Vulnerability, and III) Mitigation. For the 2007 report, Professor Karoly played a key role in Working Groups I and II, one of only two scientists to be heavily involved in both groups. He was identified also as a link person to encourage communication between the groups and is currently locked away with a select group of scientists writing a synthesis of the entire report. The synthesis report integrates the information around 6 key topics and is designed to be useful to policymakers, researchers and students alike.

As you can imagine, preparing these reports is an enormous undertaking, with many of the scientists volunteering hundreds of hours of research time to the task. But David said that it is worthwhile. "Not only is this the most comprehensive assessment process ever undertaken in science, providing valuable information to policy makers and the public, but it has also helped me plan my research by identifying key limitations in the current understanding of climate change and its impacts". Regardless of what decisions are made by governments to address the problem, the effects of climate change will be felt for centuries to come. Professor Karoly's research into climate variability and change will help prepare us for the future.

COVER SHOT

Professor Mike Sandford, School of Earth Sciences, supplied us with our cover image. He explains, 'a lot of this work has been done trying to understand when the earth was last ice free. For example the Murry Basin was flooded by sea, just as one would expect for an Ice free earth, as recently as 6 million years ago (a period of time that is almost nothing to a geologist).

However the story is bit more complicated because, in looking at the record of ancient shorelines around Australia, I have been able to show that Australia is tilting -N side down south side up at the extraordinary rate of about 20 meters per million years! (no, we dont have to jump off yet). That tells a profound story about the deep internal workings of our planet in the mantle down about 1000 kms beneath the surface.'

This work is now in press and due out in a few weeks in *Earth and Planetary Science Letters*.

Sandiford, M., 2007, The tilting continent: a new constraint on the dynamic topographic field from Australia, *Earth and Planetary Science Letters*, doi: 10.1016/j.epsl.2007.06.023

Global war on pests

THE BATTLE TO FEED DEVELOPING COUNTRIES IS NOT JUST ABOUT CROP CREATION. MARCUS DALLY-LAW TALKS TO A GENETICIST ABOUT CROP PROTECTION

Developing countries urgently need improvements in vegetable production. Brassica crops, like cauliflower, cabbage, kale and mustard, are important food-plants in developing countries and provide many of the nutrients needed for a healthy diet.

Brassicas in farmers' fields across Africa and Asia are devastated by insect pests, particularly by Diamondback moth infestations, despite extensive applications of insecticides. Insecticides are often applied every second day, with up to 50 sprays in one season. Crop losses due to Diamondback moth and other pests are extremely high – up to 90% without the use of insecticides and 35% even with frequent use of insecticides. "The situation is undoubtedly worse now, as diamondback moth continues to develop serious resistance to all classes of compounds sprayed against it, thus increasing the pressure on farmers to spray more intensively," comments Dr Derek Russell of the Genetics department, University of Melbourne.

Russell, working from the Centre for Environmental Stress and Adaptation Research (CESAR), is a part of a collaborative initiative between non-profit, science based partners and an international vegetable seed company that aims to develop a sustainable solution to the management of Diamondback moth and other caterpillar pests in cabbage and cauliflower in India and beyond. The Collaboration on Insect Management for Brassicas in Asian and Africa (CIMBAA) aims to ensure advantages for the farmer, the consumer, the environment and the company.

The work of CIMBAA has already produced promising varieties of brassicas which are resistant to pests.

This is one of the first steps towards an effective and long-term sustainable pest management program.





Bio21 Institute Seminar Series

The Bio21 Institute's 'Big Picture' Science Seminar Series hosts a range of speakers from science and industry.

Upcoming speakers include:

- 6 Sept – A/Prof Mark Rosenthal, CEO Clinical Trials Aust
- 18 Oct - Prof Ian Frazer, Aust of the Year, Uni of Qld
- 1 Nov – Prof Richard Furneaux, Industrial Res Ltd, NZ

Seminars are held at 4.00 pm to 5.00 pm
Bio21 Institute Auditorium
30 Flemington Rd (cnr Park Dve) Parkville
Enquiries to: info-bio21@unimelb.edu.au

For more information on these seminars and other events, visit www.bio21.unimelb.edu.au/Events.html. All welcome.

"Improving health through biotechnology innovation and dynamic industry engagement!"
www.bio21.org



RQF update

On the 29th June 2007, the University submitted to the Department of Education, Science and Training (DEST) the documentation related to the RQF pre-implementation trials comprising the Evidence Portfolios for 4 research groups (two of these groups were from the Faculty of Science [Optics and Materials and Statistical Mechanics] and Feed Back Report. The Evidence Portfolios are being reviewed currently by the RQF Strategy Committee as a means of preparing more fully for the RQF.

The University of Melbourne RQF Group Captains are finalising the draft memberships of the RQF research groups based on a list of eligible staff provided by HR. DEST is due to release shortly the latest update on the RQF process.

Author Matt Ridley argues nature *via* nurture

THE NATURE VS. NURTURE DEBATE HAS BEEN RAGING FOR CENTURIES. NERISSA HANNINK SPEAKS TO THE POPULAR AUTHOR, MATT RIDLEY, ABOUT ADVANCES IN GENETICS AND THEIR INFLUENCE ON QUESTIONS OF SELF.

Nature vs nurture, the contribution of our genes and environment to our personality, is a debate that has plagued humanity for years. An Elizabethan schoolmaster coined the term 1581, and UK science author Matt Ridley visited Melbourne recently to shed new light on this quandary.

Dr Ridley presented the main insights from his book 'Nature via nurture' at the Alfred Deakin Innovation Lecture, hosted by the Victorian Government and supported by the University of Melbourne.

He began the evening by noting that the debate has persisted as it is so difficult to resolve. "We know we come with innate characteristics and that our environment influences us, but actual explanations are hard to come by".

Ridley hopes the new term 'nature via nurture' will be helpful in recognizing a new way of understanding that nature is not the opposite of nurture, and genes are at the mercy of our experiences.

"The sequencing of the human genome has suggested a new hypothesis, that animal evolution usually works not by inventing new protein-coding genes (this appears to be commoner in plants), but by altering the expression of pre-existing genes".

"Genes can be determinist, for example if they give you blue eyes, there's not much you can do about it, but so can experiences".

"What people inherit is not an aptitude but an appetite. A tennis player or scholar may not have been much better at tennis or study to start with, but was innately drawn to doing a lot of tennis or study and practice that made him or her perfect. So the nature sought out the nurture".

Ridley's favourite example to illustrate the



What people inherit is not an aptitude, but an appetite

interplay of genes and environment is a study from Dunedin, New Zealand in 1972-1973. Terrie Moffitt and her colleagues investigated differences in the promoter region of the serotonin transporter gene (genes effectively have switches on them, called promoters, which consist of special sequences usually found immediately upstream of the gene itself). These differences affected the way people reacted to stressful life events – things like divorce or bereavement.

Serotonin is a neurotransmitter, a chemical 'messenger' that allows communication

between nerve cells. The study found that people with one or two copies of the short version of the serotonin promoter showed more symptoms of depression following at least three stressful life events than people with two copies of the long version. For one or two events there was no difference.

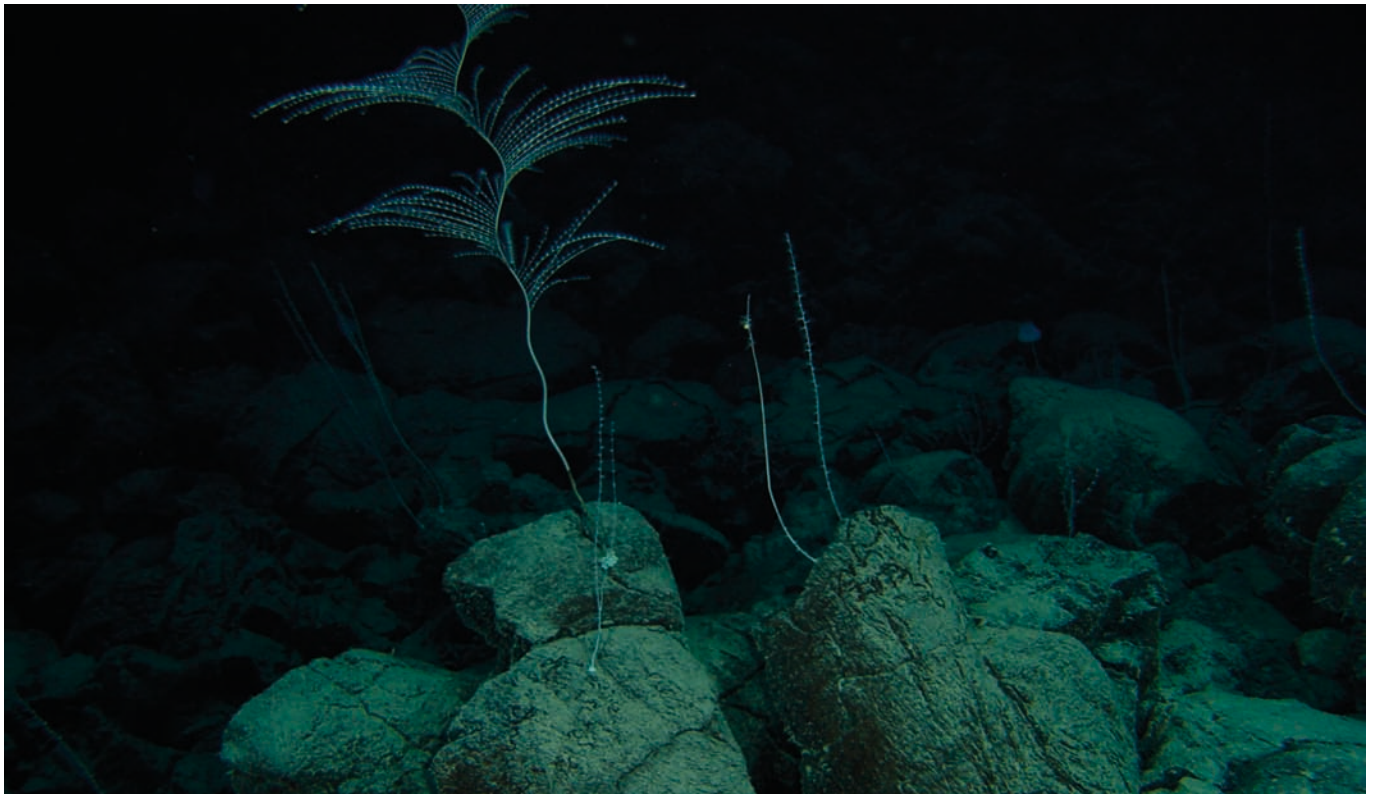
"In other words, your genome does not make you depressed, but it might make you more likely to be depressed when you suffer several external setbacks".

Ridley would one day like to have his own genome sequenced but is cautious about looking at some genes, like those for Alzheimers. He adds, "Although I think I can already guess...".

Matt Ridley's *Nature Via Nurture*, and his latest book "Crick", which explores the life of Watson Crick, one of the discoverers of the structure of DNA, are available from the University of Melbourne Bookshop.

Geological research goes underwater

THE BIG BLUE STILL HOLDS MANY SCIENTIFIC UNKNOWNNS. GEOLOGIST JANET HERGT BRINGS YOU A STUNNING PICTORIAL OF HER DEEP-SEA RESEARCH.



Associate Professor Janet Hergt (Head of Earth Sciences) joined an international team of researchers from Japan, New Zealand and the USA on board the R/V Yokosuka to examine the Earth's crust many kilometres below the surface of the ocean. Multi-beam sonar surveys were employed to map the topography of the ocean floor in a region of the Havre Trough north of New Zealand. This revealed previously unknown areas of recent rifting and volcanism in a region being torn apart by tectonic processes.

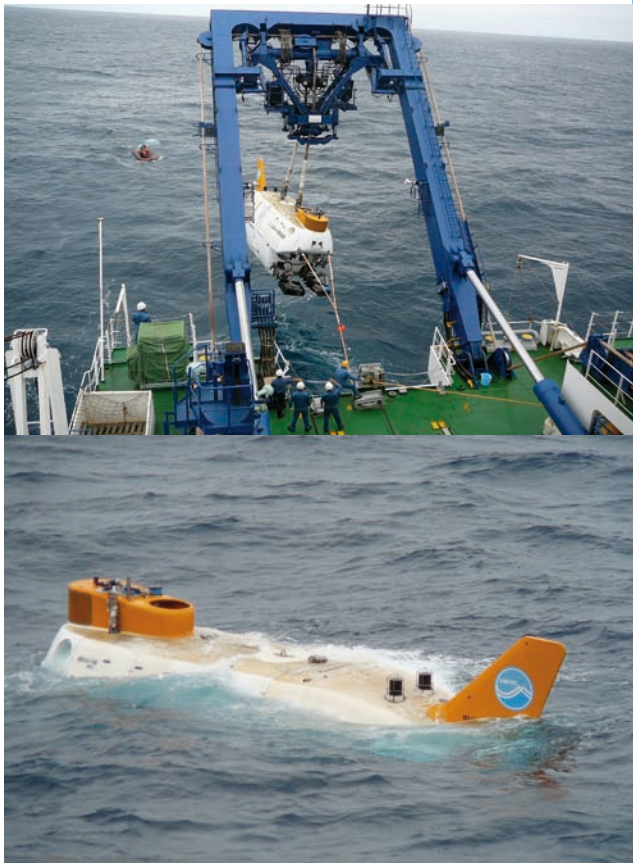
Rock samples were collected using the Japanese 3-person submersible Shinkai 6500, which is equipped with sampling arms and baskets. Janet was one of the scientists fortunate to accompany the pilot and co-pilot on one dive into a young rift valley, comparable in size to the widest and deepest parts of the Grand Canyon. Janet describes, "It was like preparing for a space launch, the entire ship is focussed on safely deploying and retrieving the Shinkai. If the conditions are not perfect the dive is called

off. This happened several times before we managed to obtain the samples we were after".

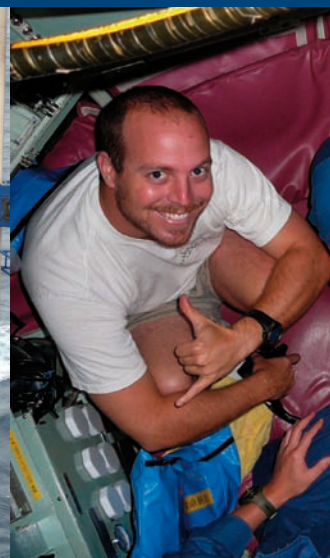
In possibly the deepest submersible dive in such a trough, Janet collected basalt samples at a depth of almost 3.7 kilometres below sea level. In the 5-hour round trip, nearly two hours were spent simply reaching the ocean floor, leaving only two hours for exploration and sampling. "During our descent the gauge reading our azimuth seemed like it was going crazy until the pilot explained we were slowly spinning like a falling leaf. I measured one full rotation every 3.5 minutes, it was amazing". This difficult-to-reach section of the basin is thought to be younger and warmer than other, more shallow regions, as it boasts more life and only a very thin dusting of sediment. The rock samples are currently being analysed and initial results will be shared at a conference in New Zealand later this year.

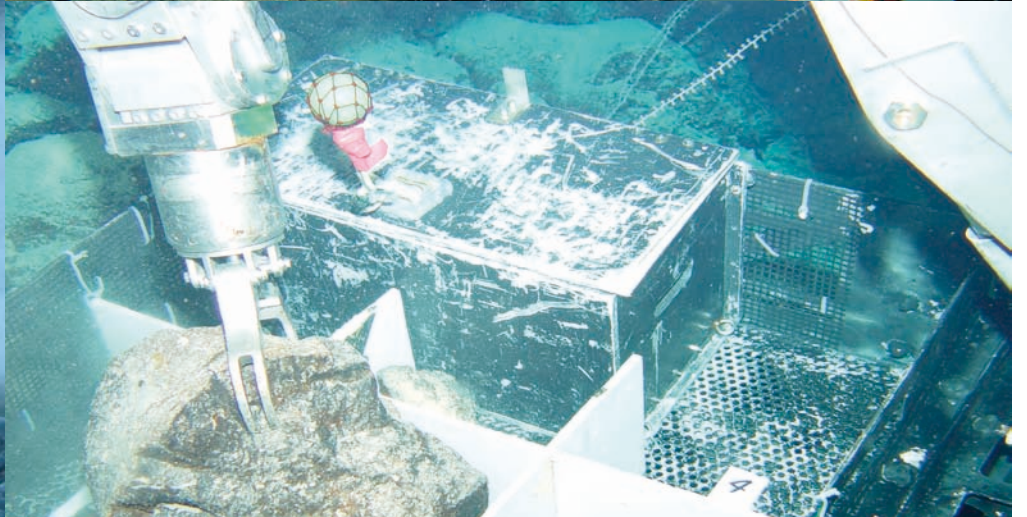
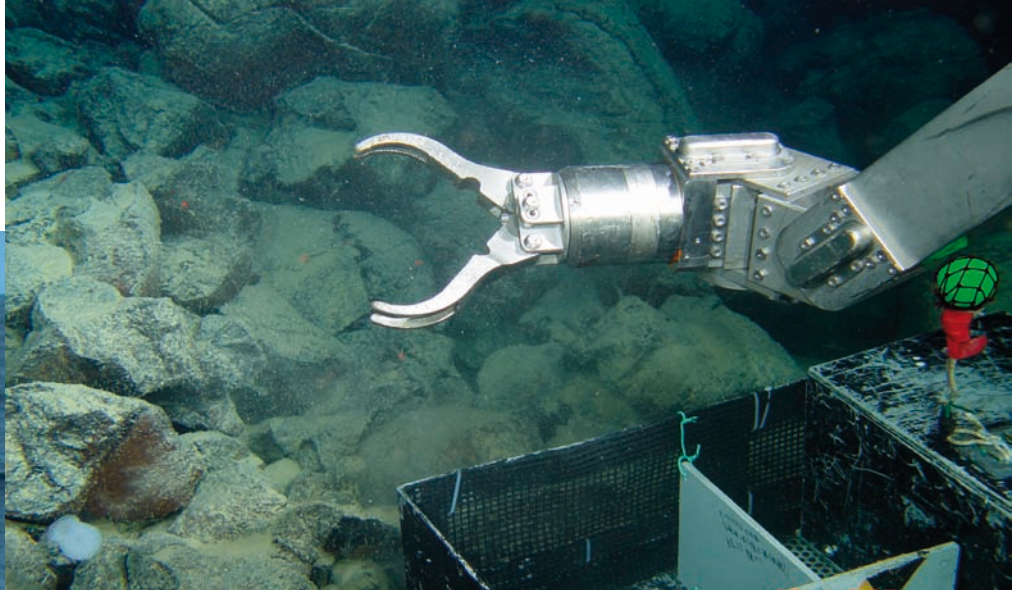


“During our descent the gauge reading our azimuth seemed like it was going crazy until the pilot explained we were slowly spinning like a falling leaf.”

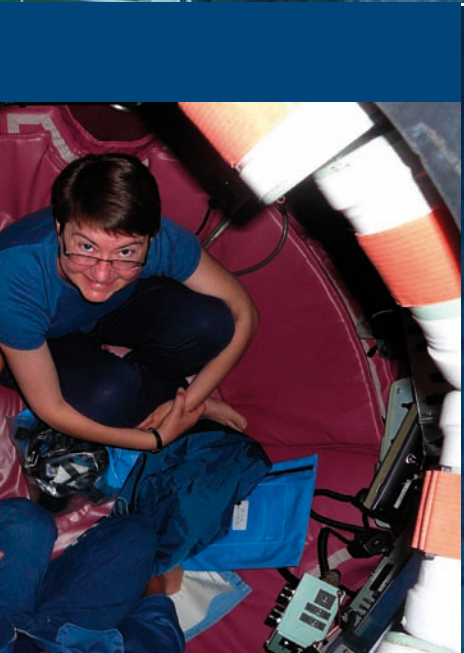


Launching the Shinkai





Collecting samples from the ocean floor



A SLUG on your benchtop



TWELVE ENTHUSIASTIC AND MOTIVATED STUDENTS FROM THE UNIVERSITY OF MELBOURNE AND LUDWIG INSTITUTE HAVE JOINED FORCES TO DEVELOP THE SCYAGENICS LABORATORY USER GUIDE. ELENA TOH AND HELEN VARNAVAS TAKE A LOOK AT THIS NEW 'SLUG'

As part of the 2007 Young Achievement Australia Biotechnology Entrepreneur Program™, the student group developed the pocketsize reference guide through a company they set up called Scyagenics. Designed by scientists for scientists, the SLUG includes commonly used laboratory protocols stemming from the fields of developmental biology, chemistry, molecular biology, protein biochemistry, microbiology, statistics and microbiology. It provides users with background information, valuable hints, troubleshooting advice and safety procedures. An additional section will be included which allows for institution specific information such as safety procedures, contact information and numbers.

Compact in size and modular in design, the SLUG allows users to customize the guide by adding the chapters that meet their research needs. Furthermore, the printed version will also be complemented by an electronic version providing a comprehensive single source of reference.



Supported by the Bio21 Molecular Science and Biotechnology Institute and the Ludwig Institute for Cancer Research and helped by research and industry mentors, the program allows students to be innovative in their thinking whilst developing their entrepreneurial business skills.

Scyagenics will be launching the SLUG at the University of Melbourne Bio21 Institute Open Day on Sunday 19th of August. With the positive feedback

received so far from laboratory heads and fellow scientists, the group is anticipating a good response for the SLUG upon its release.

Over the coming months, the company plans to build sales rapidly and is in discussions with potential future commercial partners.

For more information on the SLUG contact 83442568 or email scyagenics@gmail.com

Radical Wine Tasting

You've heard that wine in moderation is good for you, as it has lots of antioxidants to combat free radicals. But what exactly are free radicals, and what else do we know about the chemistry of wine? Come along to hear some chemists chat about their work, and engage your taste buds whilst engaging your mind. This delicious event will feature the "What's in That?" unit, a 3-D multimedia projections of some of the tasty molecules found in food and drinks.

Date & Time: 22 Aug, 5:30-7pm

Where: BMW Edge theatre Fed Sq

Cost: Free, but RSVP recommended

More Info: www.freeradical.org.au
email: felicity@freeradical.org.au



**FREE RADICAL
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**VICTORIAN INSTITUTE
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Miegunyah Public Lecture

The Science Faculty and the School of Chemistry hosted a public lecture on 8 August by Miegunyah Fellow, Professor Purnendu K Dasgupta, Professor and Chair, Department of Chemistry and Biochemistry, University of Texas at Arlington, USA.

Professor Purnendu (Sandy) Dasgupta is a native of India and was educated in a college founded by Irish missionaries. In his mother tongue, Bengali, he is a well-published poet and managed to get a diploma as a TV mechanic but finally found his love of analytical chemistry as salvation.

Sandy spent virtually all his adult life in the US and after his PhD and post-doctoral work joined Texas Tech in 1981. He became a Horn Professor in 1992, named after the first president of the University, the youngest person to be so honoured at the time.

Sandy has published over 300 papers/book chapters, and holds 17 US patents, including the electro-dialytic reagent generation and suppression technologies on which current ion chromatography is based. His awards include the Dow Chemical Company Traylor Creativity Award, the Ion Chromatography Symposium Outstanding Achievement Award (1989 and 2005), Achievement Rewards for College Scientists (ARCS) Scientist of the Year Award 2004-2005, and Best Science Paper of the Year Award, Environmental Science and Technology, 2005. He was the Royal Australian Chemistry Institute (RACI) roving analytical chemistry lecturer in 2003 and is the Editor of *Analytica Chimica Acta*, a major international journal in analytical chemistry.

Recently his work on perchlorate, an environmental contaminant, has attracted worldwide attention. In 2005, he was asked to brief the US congress on the significance of the widespread occurrence

of perchlorate in human milk. In 1994, he testified as the principal expert witness in the Royal High Courts of Justice for Hoechst-Celanese against British Petroleum. The case involved the purification of acetic acid to remove iodide impurities by ion exchange resins. The judgment, £120 million against BP, was the highest ever awarded in a patent lawsuit in Britain.



In the Miegunyah lecture Prof. Dasgupta asked if scientists should be responsible for what is done with their inventions. The invention of napalm, thalidomide with the resulting birth defects, the synthesis of the dye indigo and the effects on society were amongst the examples discussed. The pursuit of science for the betterment of humanity was another of the questions explored by Professor Dasgupta in his public lecture.

The science of fiction

IN A CYBERWAR, YOU CAN STILL DIE HARD 4.0

PHD STUDENT JIN KEE TAKES A HARD LOOK AT THE NEW FLICK

Since *DieHard 4.0* features the most face-slapping, hair-tearing, racially-turbocharged violence against women since that Tatiana and Bond scene in *Goldfinger*, the Australian release of this Bruce Willis action vehicle duly wears an M 15+ rating. Having warned you, I'm going one cowardly step further and claiming my job here is not to deal with the gender politics or provide an analysis of the coming of age story or the battle between two flawed ad-hoc surrogate families – John McClane's single parent family against Thomas Gabriel's nuclear unit. Instead I will divert your attention to the high concept of the film – that an advanced technological society is vulnerable to a war of deception, critical infrastructure attack and equipment disruption.

For instance, you may have seen from the trailers that the Big Bad Guy Thomas Gabriel (a figure who may be based on real-life cyberwar expert John Arquilla, who advocates lean and decentralised US military) attacks the "transport grid" of North America. This immediately opens up many interesting possibilities – Transport systems are designed to

be "fail safe". Traffic lights are wired up such that if a light is green, then the cross street must be red. There are only two ways to override that. One would be to manufacture a bogus controller unit, falsify its test results and wait months until maintenance upgrades all the important traffic lights in the system while maintaining absolute secrecy. The other way is to have a little gremlin sit in the control box connecting the lights manually with jumper wire.

The movie has many moments like this – a flash of brilliance with "it could almost work that way" technical accuracy, followed by gremlins in the traffic lights.

There are other aspects to net war which are portrayed convincingly in *Die Hard 4.0*: Under the command of the terrorist mastermind, false information is injected into the national cable TV and financial networks. If you believe the conspiracy theories about the 1997 Asian Financial Meltdown and the February 2007 China Correction, then the first shots of financial warfare have been fired in the real world. The Laurie Holden Hackers and the Honker

Union have battled to deface Chinese and American websites. In the 1980s Australian cracker Nahshon Even-Chaim (aka Phoenix) was trying to illegally activate the Nova laser at Lawrence Livermore National Laboratory which was apparently attached as a device, as if the most powerful laser in the world ranked along with the printers. In 1999, the Melissa worm started out as a prank and cost America \$80million in damages. Netwar, RAND's name for low intensity attrition of a nation's infrastructure and social networks appears to be alive and well. It is the more devastating high-intensity cyberwar that is still the stuff of *DieHard4.0*.

Die Hard 4.0 is a fantasy, but for the wrong reasons. If you believe *Buda's Wagon* by Mike Davis, terrorists will always choose cheap, simple weapons and operate as decentralised networks. You can't fight a cyberwar by trying to shoot the heart of an enemy that doesn't have a heart to shoot.



AROUND THE FACULTY

Student achievements

Erin Carswell wins the 2007 GSAV Canavan Prize

Congratulations to Erin for winning the Geological Society of Australia Canavan Prize for the best second year university undergraduate geology results in Victoria in 2006.

Congratulations to Chris Davis for his Highly Commended Merit Award under the GSAV Thomas Medal category in recognition of his Honours mapping project. [Earth Sciences]

Laureate Professors

The Faculty would like to congratulate Professor Keith Nugent (Physics) and Professor Marilyn Renfree for their recent appointments as Laureate Professors. Marilyn Renfree has previously held an appointment as a Laureate Professor.

Federation Fellow – Physics

A/Prof Tony Gherghetta (University of Minnesota) has been offered a Federation Fellowship to join the School of Physics. He is one of the most promising young researchers in theoretical particle physics at present. Tony is due to begin in December 2007 in the area of the new dimensions of the quantum universe.

Professor Andrew Gleadow is awarded the David White Award 2007

Congratulations go to Professor Andrew Gleadow, Earth Sciences, Faculty of Science for the David White Award (Science, Health, Agriculture, Veterinary Science)

Chris Wilson awarded the Bruce Hobbs Medal 2007

Professor Chris Wilson has been awarded the Bruce Hobbs Medal by the Geological Society of Australia's Specialist Group in Tectonics and Structural Geology (SGTSG) for 'excellence in structural geology'. The medal was awarded at the 14th SGTSG biannual conference held in July at Alice Springs. It recognizes his contribution to field based structural analyses, microstructural studies, experimental work, computer and analogue modelling of deformation, and regional structural syntheses.

2007 Chris Powell Medal

Dr. Mark Quigley from the School of Earth Sciences recently received a second national award for scholarly research: the 2007 Chris Powell Medal for an outstanding

postgraduate structure-tectonics research paper awarded by the Geological Society of Australia. The medal is for the paper: M. C. Quigley, M. L. Cupper and M. Sandiford, 2006, Quaternary faults of south-central Australia: palaeoseismicity, slip rates and origin, *Australian Journal of Earth Sciences*, 53, 285–301. Congratulations also to Matt Cupper and Mike Sandiford from Earth Sciences. The medal was awarded at the 14th SGTSG biannual conference held in July at Alice Springs.

DEST / SRIF Grant

Congratulations to A/Prof. Muthupandian Ashokkumar and Prof. Franz Grieser for being successful in obtaining funding from DEST for their project titled "Advanced Oxidation Processes for the Degradation of Organic Pollutants in Aqueous Environments" as part of the Australia-India Strategic Research Fund and in collaboration with Madurai Kamarajar University, the Indian Institute of Technology, the National Institute of Technology and the University Institute of Chemical Technology. Only 20 projects have been chosen out of 150 applications. The funding is for \$370,000 over three years, starting in September 2007.

Staff news Promotions

The Faculty fared well in the recent round of Academic Promotions with congratulations to the following eight successful staff members:

Promotion to Level B

- Atif Ahmad (Information Systems) – Lecturer
- Reeva Lederman (Information Systems) – Lecturer
- Alison Funston (Chemistry) – Research Fellow Grade 2
- Alexandre Pezza (Earth Sciences) – Research Fellow Grade 2
- Paul Umina (Zoology) – Research Fellow Grade 2

Promotion to Level E:

- Peter Forrester (Mathematics & Statistics)
- Kerry Landman (Mathematics & Statistics)
- Lloyd Hollenberg (Physics)

Farewells

Sandra Gordon

The Faculty congratulates Sandra Gordon on her recent appointment as Faculty General Manager in Architecture, Building and Planning. It is a wonderfully deserved recognition of Sandra's skill and contribution to the University that she has been selected for this position from a strong field of applicants. Her departure from Science is an enormous loss to us. She has headed a team in the Secretariat and across the departments that have made this Faculty a benchmark in financial practice across the University. More than that, she has been a wise adviser to Deans, Heads and Managers across a range of university services where her experience and judgement have been invaluable. We will miss her cheerfulness, her resourcefulness and her calm.

Emma Maslen

Emma Maslen, Science Student Advisor, recently accepted the position of Project Officer: Orientation and Events. The Faculty thanks Emma for her contribution to the Academic Programs team and wish her all the best for her new position.

Greg Slatcher

Greg Slatcher, Manager, Marketing and International Relations, accepted a role at Deakin International as their International Marketing Manager, leaving the University in late June.

Obituary

Death of Dame Joyce Daws

Dame Joyce Margaretta Daws, who in 1976 was the first female President of AMA Victoria, died on Wednesday 13 June. A thoracic surgeon, she was appointed a Dame of the British Empire in 1975, for services to medicine.

Until 2004, Dame Joyce Daws represented the Soroptomist Society on the annual Dame Margaret Blackwood Soroptomist Scholarship Committee. The scholarship is awarded to graduates to enable them to undertake postgraduate study at the University in Genetics in the fields of any one of plants, animals or viruses.

The Science community will mourn her loss.

Fifth World Science Journalists Conference

THE UNIVERSITY OF MELBOURNE WAS PROUD TO WELCOME SCIENCE JOURNALISTS FROM ALL OVER THE WORLD IN APRIL. FELICITY JENSZ REPORTS.

In April over 600 national and international science journalists and communicators descended on Melbourne for the 5th World Science Journalist Conference.

The conference brought together journalists, communicators, editors, and scientists from different geographical and science areas, with The University of Melbourne being the principle academic sponsor for the conference.

The delegates were treated to a spectacular reception hosted by the University of Melbourne at Bio21 Institute. Upon entering the atrium, the delegates were presented with the human face of research through snapshots of cutting edge science undertaken at the University on the big screen.

The Chancellor, Mr Ian Renard, welcomed the enthusiastic delegates, with other distinguished university staff members including the Dean of Science, Professor Peter Rathjen, and the Associate Dean of Community Engagement and Development, Associate Professor Phil Batterham, also addressing the crowd.

Literally under the banner of the new Melbourne Model slogan 'dream large' three strands of the triple helix were brought together with research, learning and teaching, and knowledge transfer all on display for the engaged delegates.

The night featured a number of science-based activities, including the outrageously entertaining MUPPETS (who are also known by their longer name – the Melbourne University Physics Promotion, Education and Teaching), lead by Dr Roger Rassool of the School of Physics. He and his team dragged audience members onto the stage to be part of the performance. One of his 'victims' was Professor Carl Schiesser from the ARC Centre of Excellence for Free Radical Chemistry and Biotechnology who said of the experience, 'I enjoyed being part the show, and think that it is a great way to engage young students in the wonders of physics'.

Young students were also present on



the night as the winners of the joint University of Melbourne and *Herald Sun* science writing competition were announced, with prizes awarded by the Professor David de Kretser, AC, Governor of Victoria, and Blanche Clarke of the *Herald Sun*.

University of Melbourne students themselves were also present as they launched the an Australian edition of the prestigious international student-run science journal *The Triple Helix*, a journal which addresses issues concerning science in law and society. Following an incredible entrance, in which Triple Helix's Australian Chief Operating Officer sang for the assembled crowd, Associate Professor Phil Batterham commented that the journal embodied all three strands of the University's own triple helix. 'In writing about research, the students are learning as well as transferring knowledge to the community.'

For the community of science journalists present at the reception the event provided a relaxed atmosphere in which they could share knowledge and ideas with other like-



minded people in an environment dedicated to the promotion of science.

PUBLIC LECTURES

International Workshop on Applied Sonochemistry

Bio21 Institute Seminar Series

More than 12 leading international scientists

Monday 17th September 2007, 8:45am
Rainforest Room, Melbourne Zoo, Elliot Avenue,
Parkville 3052 (Melways Ref: 43 E1)

The workshop is aimed at highlighting both the fundamental and applied aspects of sonochemistry. The workshop will have a select number of leading international scientists working in the area of sonochemistry to deliver a series of keynote lectures. The contents of the lectures will span a broad range of ultrasound induced chemical processes. A series of additional lectures will also be presented dealing with current sonochemistry research programs in Australia. The workshop will also create an opportunity for the commercial sector to be introduced to, and made aware of, ultrasound-based technology and its potential applications. This workshop has been partially funded by our major sponsor: the Australian Academy of Technological Sciences and Engineering (ATSE)

Important deadlines:

Registration – closes 31 August 2007

Contact Ms Francoise Gelb
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fgelb@unimelb.edu.au

Climate change or human impact? Australia's megafaunal extinction

SELWYN SYMPOSIUM 2007

Presenters:

Dr John Long, Museum of Victoria (Plenary Address)
Dr Judith Field, The University of Sydney
Prof. Peter Kershaw, Monash University
Julien Louys, University of New South Wales
Dr John Magee, The Australian National University
Prof. Gifford Miller, University of Colorado
Dr Gilbert Price, The University of Queensland
Dr Gavin Prideaux, Flinders University
Dr Stephen Wroe, University of New South Wales

Thursday 27 September 2007
The Copland Theatre
University of Melbourne

This Symposium brings together many of the researchers from around Australia to present their views on what caused the megafaunal extinction. Talks will be presented on all aspects of this controversial subject.
Email: sjgall@unimelb.edu.au

If you would like your event advertised in Science Matters please contact Lisa Mifsud on +61 3 8344 6404 or l.mifsud@unimelb.edu.au.

Free Public Lectures from Leading Science Academics
All lectures start at 6:30pm sharp in Theatre A, Elisabeth Murdoch Building
Everyone is Welcome – bookings not required
For further information visit www.science.unimelb.edu.au/events.php

Copper in sickness and in health - implications for Alzheimer's disease **Inaugural Professorial Lecture**

Professor James Camakaris, Department of Genetics
Copper is essential for life, however it can be toxic if present in excess amounts. Chronic nutritional copper deficiency, through lack of a balanced healthy diet, may contribute to osteoporosis and cardiovascular disease. Too much copper and it may cause toxicity in the brain and liver. Copper has a special role in the normal brain and is present there in relatively high amounts. Professor Camakaris' research suggests changes in copper balance in the brain may play a critical role in degenerative brain diseases such as Alzheimer's disease. This research should lead to improved approaches for diagnosis and treatment of Alzheimer's disease.
Wednesday 12 September 2007

Gas phase eye for the condensed phase guy: Structure and reactivity via mass spectrometry

Inaugural Professorial Lecture
Professor Richard O'Hair, School of Chemistry
Ever since mankind started buying and selling items there has been a need to weigh objects. The ultimate weighing machine is the mass spectrometer, which can measure the mass of a species ranging from atoms through to large biological molecules such as proteins. Professor O'Hair will explore the use of modern mass spectrometers as reaction vessels to study the structure and reactivity of a wide range of species. This is relevant to areas as diverse as industrially important catalytic processes through to the role of small organic molecules in helping plants store heavy metals such as nickel.
Wednesday 10 October 2007

Seeing the light with polymers

Professor Andrew Holmes, ARC Federation Fellow, School of Chemistry
ARC Federation and VESKI Fellow, Bio21 Institute

Most of us are familiar with the use of plastics (polymers) as insulators or as lightweight structural alternatives to metals. However, since the discovery that certain types of polymers could be made conducting by the use of "dopants" there has been an enormous interest in their use as both conductors and semiconductors. This presentation will describe the development of light emitting polymers that can be made to fluoresce by application of a voltage across a thin film sandwiched between electrodes, one of which is transparent. The development of materials that emit light in the three primary colours (red, green and blue) has led to the expectation that this technology will eventually emerge in flat panel displays such as laptops and TV screens, and possibly also as cheap low-voltage solid state lighting.

Wednesday 17 October 2007

Fungi: The good, the bad and the ugly

Inaugural Professorial Lecture
Professor Barbara Howlett, School of Botany
The fungal kingdom comprises a myriad of species, which have a diverse range of impacts on society. The good ones we can eat or use in food processing and antibiotic production. Others, the bad and often the ugly, are poisonous or cause devastating diseases in plants and animals, including humans. Professor Howlett will discuss one of the 'baddies' - the blackleg fungus, which causes major losses to the yield of canola in all countries where this oilseed crop is grown. Field and lab-based approaches, including genomics, are leading to new ways of understanding and controlling this important plant disease
Wednesday 24 October 2007