When time of death is the bone of contention

by Lindy Brophy

Scenario 1: A body is discovered in a shallow grave. Flesh and hair are still covering the bones. Forensic entomologists or pathologists are called in to determine the time and cause of death and to help with identifying the corpse.

Scenario 2: Remnants of bones are found near an ancient burial site — human remains from possibly a century or more ago. Anthropologists are called in to carbon date the bones to work out their age, possibly their gender, perhaps cause of death.

But what about the skeletal remains that fall between the two? A body that is decomposed to the point where no flesh remains, but is obviously not an archaeological artefact?

This is where Dr Shari Forbes comes in, with her new developments in using radio isotopes to pinpoint time of death from human bones.

Dr Forbes is coming to the end of her Postdoctoral Fellowship at UWA’s Centre for Forensic Science.

Racing with the right formula

Young UWA engineers are dominating the world student racing car arena with the strength that Michael Schumacher and Ferrari exerted on Formula One racing for many years.

For the second consecutive year the UWA Motorsport team has won the Carroll Smith Memorial Prize for the Best Designed Vehicle in the Formula SAE championships held in Detroit, USA last month.

The UWA team finished in second place overall in the international competition of 111 teams, winning eight trophies and $US9550 in prize money.
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She and Dr Jan Meyer, lecturer in Anatomy and Human Biology, have been using nuclear energy to enhance the dating accuracy of current forensic methods for bodies where no soft tissue remains.

“Decomposition can take a matter of weeks or many years, depending on a variety of factors — whether the body was on the surface or buried, whether it was clothed, whether the weather was hot, humid or cold,” Dr Forbes explained.

“While forensic anthropology has made great strides in the past 50 years, we can still only make a guess at the time of death from skeletal remains,” she said.

She hopes that radioisotopes will provide the key. “The body takes in radioisotopes while we are living, and then begins to release them when we die. If the isotopes are released at a certain rate, we can use that information to determine how long a body has been dead,” she said.

A forensic chemist, Dr Forbes (pictured above) has been working with the Australian Nuclear Science and Technology Organisation in Sydney. “Within a few months, we should have some results that will tell us how useful radioisotopes are.”

By then, Dr Forbes will be Assistant Professor Forbes, co-ordinating forensic studies at the University of Ontario in Canada.

“But I’ll keep working with Jan on this project to its completion,” she said. Her area of forensic science is designed to provide police investigators with a timeline to help with linking skeletal remains with missing persons records.

Dr Forbes is cutting short her postdoctoral position at UWA by six months, and using only half of the Humboldt Fellowship she was recently awarded, to study and work in Germany, so she can take up the senior position in Ontario.

It’s been a fast track for Dr Forbes since she decided ten years ago to combine her studies in Chemistry at the University of Technology Sydney with forensic science.

“That was before all the hype about forensic science, and all the books and television programs that have made it now such a popular area of study,” Dr Forbes said.

“There were 18 students in my undergraduate forensic science class. Now the same class has 50 or 60 students in it. Every one of the students I graduated with found jobs in forensic science. It is getting harder for graduates now. But new areas of forensic endeavour are opening up, such as wildlife forensics or environmental forensics.

“It’s important to remember that forensic science is not a science, but a group of sciences, put together under a heading, that are useful for helping to solve crimes. They can include disciplines such as chemistry, pathology, entomology (insects) and palynology (the study of pollen).”

Dr Forbes has recently returned from NecroSearch training in Colorado. She was one of four forensic scientists (the others were from Serbia, Ghana and India) who were trained to join NecroSearch International, a small highly-trained group of volunteers who are ready to help law enforcement agencies around the world to locate clandestine burial sites and mass graves.

Racing with the right formula  continued from page 1

“Each year our Motorsport team wins international awards. There is no doubt the Motorsport project and others available to our students ensure that our graduates are exceptionally well prepared for employment as engineers and managers, and are highly sought after by employers,” Professor Mark Bush, Dean of Engineering, Computing and Mathematics, said.

He said students involved in the Motorsport project developed and demonstrated extraordinary skills in teamwork, management and leadership, technology, design and analysis, financial management, health and safety, and marketing.

The 70 undergraduate students involved in the 2004 UWA Motorsport team designed, built, financed, managed and competed in an open wheel racing car. Their overall ranking improved from 13th last year to second this year. (The 2003 team competed in Detroit in 2004, the 2004 team in 2005.)

The Formula SAE competition tests the vehicles in a range of events including endurance racing and rates the teams on their capacity to plan, finance and market their project to a board of investors.

In addition to the design award the UWA team also won the Ricardo Powertrain Award, for innovation and design; the Society of Plastics Engineers’ Composites Award; the Arvin Meritor Suspension System Award; the Altair Engineering Innovation Award; and the Polaris Intake System Design Award.

The UWA team will compete again in the Australasian championships in December, for the fifth time. According to Jonathan Lowe, the 2005 engineering manager, the team has already completed the laying up of the carbon composite chassis. Major parts have been designed and are in the process of manufacture, and they are computer modelling the engine to optimise the exhaust package.
A premier novelist

Gail Jones has never known the anguish of being rejected by a publisher.

The winner of this year’s WA Premier’s Book Award for her new novel, *Sixty Lights*, has experienced instant success with all of her four published books, two collections of short stories and two novels.

Her first book, *House of Breathing*, won the Hungerford Prize in 1992, which meant it was automatically published, and her career was on its way.

But, although she knows she’s fortunate, the shy writer has never been comfortable with the accolades her career has heaped upon her.

“I don’t want to sound ungracious about awards,” she said. “Writers do feel very supported by awards and prizes. But I am just as happy to receive a letter or an email from somebody I don’t know who has enjoyed something I’ve written.”

Associate Professor Jones has been teaching University English courses since she completed Honours at UWA. But she said she did not have the confidence to write until she was in her 30s. *House of Breathing* and her second book, *Fetish Lives*, are both collections of short stories.

“I cherish the short story, but it is habitually denigrated by publishers; not deemed as prestigious as the novel. So many people asked me, when I published my short stories, if I was now going on to write novels. But the short story is much more than a stepping stone to a novel. I would like to write more short stories one day.”

Finding time to write is difficult for A/Professor Jones. “I can’t write while I’m teaching, so I have to wait for holidays and study leave. I always have ideas in my head and I jot things down in notebooks and they smoulder away, until I have some time to sit down and write them. When I get some writing space, I work very hard.”

Behind the Play

A bit of dirty work goes on behind the play in Australian Rules Football.

And it’s not only on the ground, with players getting thumped, but in the boardrooms, with executives getting dumped.

Honorary research fellow in history, Associate Professor Tony Barker, has written an intriguing history of Australian Rules football in WA from 1868, called *Behind the Play*.

It won the inaugural prize for history in the Premier’s Book Awards.

Rather than a lightweight companion to the game that most books on football tend to be, *Behind the Play* is a serious look at the administration and politics of Australia’s favourite sport.

A/Professor Barker says that, while it is written with scholarly methodology, it is accessible to a wide range of readers, with some entertaining stories.

The WA Football Commission approached A/Professor Barker to write its history after he had published a history of the WA Cricket Association.

“They still wanted me to do it, even when I told them that I was not a fan of the game!” he said. But not being a partisan supporter may have made the task easier.

“I enjoyed talking to the people involved, but a lot of the interviews with the old ‘legends’ of the game were taken from videoed interviews by former great cricketer and footballer, Keith Slater.”

Like to read more? *Behind the Play* is published by the WA Football Commission and is available from West Australian Newspapers Ltd ($85 for hardback and $49.95 for soft cover).
Setting operational goals

For the past five years, the University’s operational activities have been very successfully — with the support of staff across the University — guided by an Operational Priorities Plan (OPP).

The OPP is now an integral part of the University’s cycle of planning and accountability, providing the link between broad strategic and detailed operational planning.

The OPP establishes a framework of specific priority objectives, associated performance indicators and implementation strategies, and assigns executive responsibility and accountability for particular objectives. In this regard, not only is it a critical element of the planning process, but it is also a management, accountability and quality assurance tool.

The University is now in the process of formulating a new OPP to take us through the three years from 2006. Following a careful evaluation of our 2003–2005 OPP, initial discussions in Senate, the Executive and with Deans and other senior management suggest we should have fewer but broader priority objectives this time round — six strategic priorities in five areas (compared with 27 in 2000-2002 and 13 in 2003-2005):

- **Teaching and Learning**: to improve the quality of the student learning experience;
- **Research and Research Training**: to improve the quality, productivity and impact of research and research training;
- **External Relations**: to improve the University’s positioning, reputation and strategic relationships;
- **Resourcing**: to increase and diversify the University’s income, with particular emphasis on (unrestricted) general purpose income;
- **Management**: to improve staff quality, conditions and performance; and to improve the efficiency and effectiveness of University management.

These strategic priority objectives will be subdivided into more specific operational objectives with specific implementation strategies, performance measures and/or targets. And responsibility will be assigned between the Executive (strategic priority objectives) and university managers (operational objectives and strategies).

It is understood and accepted that the implementation of these institution-wide priorities across the campus will involve a degree of flexibility and local variation at faculty and school level. However, I want to ensure that in setting operational objectives and strategies we set targets which stretch our capabilities though realistic but ambitious goals.

The Operational Priorities Plan has a bearing on all aspects of our University’s activities and I am keen that all our staff has the opportunity to contribute to the development of the plan, both centrally and at the faculty and school levels.

At this formative stage, any comments can be directed to me (Alan.Robson@uwa.edu.au), Registrar Peter Curtis (pcurtis@admin.uwa.edu.au), or the Director of Planning Services, Robert McCormack (Robert.McCormack@uwa.edu.au).

**Alan Robson**  
Vice-Chancellor

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**New governor from UWA**

UWA Chancellor Dr Ken Michael will take up the post of Governor of Western Australia on Australia Day 2006.

The Premier announced Dr Michael’s appointment last week describing him as a much respected person in the community with a distinguished career in the public service.

The Vice-Chancellor, Professor Alan Robson, said the announcement reflected the continuing connection and relevance of the State’s oldest university to the community it serves.

Professor Robson praised Dr Ken Michael, an engineer, as a leader of great inclusivity, a factor which had brought him accolades in both university and community life.

“The announcement reflects on the character of Dr Michael, a UWA graduate and a well-recognised and respected citizen of Western Australia who has contributed greatly to the community and the State over his lifetime,” the Vice-Chancellor said.

“As Chancellor, Dr Michael has led the University’s governing body – Senate – since May 2001 with vision and wisdom in support of the University’s overall strategic aim of achieving international excellence,” Professor Robson said.

Professor Robson also paid tribute to the current Governor, His Excellency Lieutenant General Dr John Sanderson for his service to the community and his support of the University.
A species of lotus (*Lotus glaber*) growing in the waterlogged saline flats of Argentina could help Australian farmers to cope with the combined threats of salinity and waterlogging.

CRC Salinity PhD researcher Natasha Teakle has just been awarded the AW Howard Memorial Fellowship to support her international research. This is the third year in a row a CRC Salinity student has received this prestigious fellowship.

Grazing systems based on perennial plants are promising options for tackling salinity if they can both reclaim saline land and provide feed through the autumn feed gap.

Systems based on saltbush can stabilise watertables, but grazing animals need both protein and energy sources to thrive. The holy grail of plant research is therefore a tasty perennial legume that tolerates both salinity and waterlogging – Natasha Teakle hopes that *Lotus glaber* could be the answer.

However, the path to develop an Australian commercial cultivar is long and complex, and it would probably be up to 10 years before commercial varieties were available for farmers.

This is where smart research based on good experimental design and extensive collaboration comes in. Natasha’s PhD research will see her working with world leaders in plant physiology, molecular biology and plant breeding. Collaboration with Professor Tim Flowers at Sussex University will assist Natasha to investigate the physiology of salt tolerance in *L. glaber*, and then a year’s research with Dr Anna Amtmann at Glasgow University will help her isolate the gene(s) controlling sodium transport.

Currently the way in which *L. glaber* tolerates conditions of salinity and waterlogging isn’t understood, and the variation in the species hasn’t been characterised. Natasha hopes to identify genes for these traits in *L. glaber*, allowing researchers and plant breeders to quickly screen plants and greatly accelerate the development process.

Returning with this knowledge and experience in 2007, Natasha will be well-placed to screen the best bet cultivars emerging from the Australian Wool Innovation-funded CRC project *Developing new Lotus species for Southern Australia* led by CRC partners Dr Daniel Real and Graham Sandral. Natasha is also hopeful that molecular markers developed for *L. glaber* can be applied or adapted to screening other Lotus species.

So where do the spittle bugs come in?

Understanding mechanisms of ion transport within living plants requires access to the ions without interrupting the process or destroying the plant. Researchers at Sussex University recently demonstrated that xylem-feeding spittle bugs (similar to aphids) do not disturb the natural processes of ion transport within the plant, but their urine gives a direct measure of the levels of different ions at different feeding sites on the plant – a window into the physiological mechanisms the plant uses to regulate ion transport. This is crucial to understanding how salt-tolerant plants cope with toxic ions like sodium and chloride.
They look after valuable collections, ensure the safety of staff, help to choose future doctors and dentists, and welcome visitors to the University.

Who are these people of such diverse talents?
They are some of the unsung heroes of the University, the volunteers who give their time, some of them once a week, some of them once a year, to help UWA run smoothly.

More than 300 unpaid volunteers work in five different areas, and there are supporters, such as Friends of the Grounds and Friends of the Library, who are also involved with University activities in their own time.

The Callaway Centre in the School of Music, the E. de C. Clarke Geological Museum, the Visitors Centre, the Safety and Health Office and the Faculty of Medicine and Dentistry all depend on volunteers to carry out work that cannot be done by paid staff.

Dick Anderson looks after the Verdun Williams collection in the Callaway Centre. He is at the centre every Monday, making sure things are in order and he is on hand for anybody who would like to borrow music from the great conductor’s extensive collection.

Dick was a lecturer in Physics, who completed his PhD at Glasgow University. “I took up music in self defence!” he laughs. When his first wife, an oboist, died, she left him with four children to bring up. All of them played a musical instrument: bassoon, French horn, violin and flute. So Dick learnt to play the cello to keep up with them.

When he remarried, his second wife also had four children who were all musicians, one of them now a professional cellist.

“I went back to University when I was 50-something and did a BA in music,” he said. Dick became great friends with Emeritus Professor David Tunley and the late Frank Callaway. Five years ago, he offered to be the honorary librarian for the collection which Verdun Williams left to UWA on his death. “I was worried that the music wouldn’t be used if there wasn’t somebody to help put it in order and supervise the lending,” he said.

The collection of classical music, much of it for string orchestras, has more than 2,000 playing sets.

Dick, like many other retirees, has more than one voluntary job. He also works in the library at the WA Museum, in the periodicals section.

A total of 28 volunteers help Visitors Centre manager Terry Larder, to keep the Centre running five days a week.

“They’re all graduates of UWA,” Terry said, “and the contribute a great richness to the Visitors Centre with knowledge and history.”

Some of the volunteers work once a week, others as they fit it in to their typically busy lives.

“May of the people who visit the University are older graduates and it’s great that our volunteers have the time to natter with them about the old days at the University,” Terry said.

Jean Cecil graduated from UWA with a Bachelor of Science in 1945.

She was the first graduate to put her hand up to work in the Visitors Centre in 1999, when Terry used Uniview to ask for volunteers. Jean has been coming to the Centre every Monday morning for more than five years.

“It’s funny when people ask me if the University is the same now as it was when I was here. They think the buildings are older than me! I remember Winthrop Hall being built and my mother saying she thought it looked just like the bathing pavilion at Bondi Beach!” Jean said.

She studied Chemistry in the building that now houses geography. Physics was in the geology building.

“I was good at maths but a maths degree didn’t get you anywhere in those days, particularly if you were a woman, so I chose science. When I finished my degree, I worked in the Government Chemistry Laboratories for three years, then I married and had two sons.

“After I’d been at home for a few years, I wanted something decent to do, so I got a job back here as a demonstrator in the Chemistry labs, and I worked here for 25 years, from 1970 to 1995.”

Jean, who will be 82 in September, said she jumped at the chance of returning to UWA once again, in her retirement.
The biggest single group of volunteers at UWA are the interviewers for prospective medicine and dentistry students.

Last year, the Faculty trained 170 interviewers, more of them University employees than members of the community.

They interviewed 494 hopeful students face to face, and a further 16 overseas applicants by phone. Added to the 30 applicants for the first graduate entry program, this was 540 interviews.

All interviewers gave feedback, some of which will be incorporated in next year's interview system.

The Faculty recently held a function at the University Club to thank the volunteer interviewers, at which they were told that, since interviewing for places in medicine and dentistry started seven years ago, the drop-out rate of students had dived dramatically to almost zero.

If you have any unsung heroes in your area, let us know so we can recognise them for you.

The Safety and Health Office recognises its volunteers with annual Safety Awards.

This team from the Library won an award last year.

“I don’t do much really, just direct people to places, and chat with them about the University. I also check the Death notices to help Terry keep the alumni records up to date. I wouldn’t bother looking at them otherwise, so I suppose it keeps me up to date too.”

Other volunteers at the Visitors Centre include retired oral surgeon Ted Adler, who was UWA’s first dental graduate; Terry McCall, a WWII transport pilot who was based at Milne Bay, the depot for the Battle of the Coral Sea; Keith Abercrombie, a member of UWA Senate for 15 years; and Freda Livingston, a retired school teacher, who is also a volunteer at Kings Park.

Jenny Bevan, curator at the E. de C. Clarke geological museum, in the School of Earth and Geographical Sciences, has double the number of volunteers at the Visitors Centre.

“But they only work here once or twice a year,” Jenny said. “They open and look after the museum on Sundays. Without them, we wouldn’t be able to open on the weekend at all.”

The volunteers all have a common interest in geology, and circulate a newsletter among themselves and organise occasional field trips, at their own expense.

University staff have also taken on volunteer roles on campus. More than 50 of them are health and safety representatives, and there are nearly 30 safety officers and 45 building wardens (formerly fire wardens).

The health and safety reps do a full week’s training, and are then expected to carry out regular inspections of nominated areas on campus.

“The volunteer reps are quite critical,” said Mike Rafferty, Manager, Safety and Health. “They sign off on incident and injury reports and can help to prevent dangerous situations being repeated. They monitor the campus continually with their safety inspections.

“It takes a big workload off us. We can’t measure it, but if there are no problems, we know it’s being done.”

Building wardens are responsible for co-ordinating evacuation of a building or area in an emergency and for relaying information to Fire and Emergency Services. Safety officers pass on changes in health and safety legislation from the SHO to their specific areas of responsibility.

University staff Rosemarie Powell from General Practice, and Justine Leavey, from Population Health, were among interviewers for places in Medicine and Dentistry.

If you have any unsung heroes in your area, let us know so we can recognise them for you.
The winter season at the Institute of Advanced Studies spans the universe, from the Big Bang and cataclysmic explosions to the latest in minute scale nanotechnology.

Three symposia are scheduled for July, on nanotechnology, landscapes and belonging, and social impacts of oceanic voyages.

Also in June and July, the IAS will host two of Australia’s most popular and creative speakers: physicist and broadcaster, Paul Davies, and business guru Allan Fels, delivering the Kyle and Reid Orations respectively.

The second in a series of public forums on Our Drying Climate opens the season.

Michael Mobbs, a devotee of sustainability, renovated a 100-year-old inner-city terrace house in Sydney in 1996, creating what most would think impossible: a house in the middle of Australia’s biggest city that produces its own power and water and reuses its sewage on site. It is Sydney’s famous Sustainable House, also the title of Michael Mobbs’ best-selling book.

He will pose the question: “Why do we live as if the environment will negotiate, when it cannot?” in a public forum, which is part of Our Drying Climate, a collaboration between UWA and the Water Corporation. The forum will be in the Octagon Theatre at 6.30pm on Tuesday June 28.

The following evening, Wednesday June 29, Professor Paul Davies will expand the horizon in the annual Sir Wallace Kyle Oration, hosted by Professor Alan Robson.

“Violence is the leitmotif of the universe,” said the man who has been described as Australia’s best-known scientist and nominated by The Bulletin magazine as one of the country’s ten most creative people.

“The universe was born in a big bang. Its fundamental structure was forged in a searing maelstrom of unimaginable ferocity, at temperatures exceeding a trillion degrees. Its history is one of cataclysmic explosions, implosions and collisions of literally astronomical proportions.

“Yet amid this cosmic mayhem, life has not only emerged, but flourished. How has something so delicate and elaborate as life made a home amid the chaos of a violent universe?”

His lecture, at the Octagon Theatre at 6pm, Life in a Violent Universe, will examine creative and destructive aspects in the story of life.

Another prominent orator, Professor Allan Fels, has been almost a one-man watchdog on consumer and business affairs as Chair of the Australia Competition and Consumer Commission, Chair of the Trade Practices Commission, and Chair of the Australian Prices Surveillance Authority.

He is now Dean of the Australian and New Zealand School of Government, a new institution to provide senior management development programs, and a Professorial Fellow in the Political Science at the University of Melbourne.

Born and educated in WA, Professor Fels graduated from UWA with first class honours in economics and law. He will present the Reid Oration on Thursday July 21 at 6.30pm in the Octagon Theatre, looking at the regulation of business and its public administration.

Nancy Fraser, a leading figure in critical theory, will include UWA in her Australian tour, with a lecture on reframing justice in a globalising world in the Social Sciences Lecture Theatre, at 7pm on Tuesday July 26.

She is a professor of philosophy and politics at New School University. Professor Fraser is widely regarded as the most important feminist critic and moral philosopher of the present time.

Her work has contributed to the increased focus now being given to the ethical approach to social issues, and is of profound interest to both public policy-makers and activists.

The next evening, Wednesday July 27, the University Club hosts George Ellis, a leading theoretical cosmologist, renowned for his bold and innovative contributions to the dialogues between science and religion.

His social writings were condemned by the former apartheid regime of his native South Africa. But he persisted with his
investigations and anti-apartheid activism, delving into the synergy of science and spirituality. He keeps company with some of the world’s best minds, including Stephen Hawking, with whom he published a book.

George Ellis is a professor of applied mathematics at the University of Cape Town, but his areas of influence have no boundaries. He won the Templeton Prize in 2004, the world’s biggest annual monetary prize given to an individual. (Paul Davies won the Templeton Prize in 1995.)

Professor Ellis’s lecture, The Way the Mind Works: How Emotion Underlies Intellect, is at 7pm in the University Club Theatre Auditorium.

The first of three symposia hosted by the IAS is the second part of a cross-disciplinary symposium, hosted by the University of Barcelona’s Centre for Australian Studies, Landscapes of Exile.

Landscapes, Exiles, Belonging, Home is a weekend (July 15, 16) at New Norcia founded by Benedictine monks from Spain in the 1880s. The monks exiled themselves to remote Australia, but then created a unique settlement that became their home. It is one of the great cultural heritage sites of Australia, with 27 buildings classified by the National Trust and the town as a whole registered on the National Estate.

It is the perfect setting for a continuation and extension of the themes explored in Spain. Distinguished Australian composer Peter Sculthorpe is one of the keynote speakers, and will perform his new symphony, New Norcia, during the symposium.

Novelist Maryse Conde from Guadeloupe in the French Caribbean, is the other keynote speaker and together, they will lead a discussion on the experience of exile, addressing ideas of exodus, forced migration, occupation, diaspora, displacement and mourning.

Presentations will draw on the Indigenous experience, the visual, literary and cinematic arts, music, the outback and landscapes. The symposium is convened by Associate Professor Terri-ann White, Director of the AIS.

Another symposium that builds on an earlier one in Europe is Middle Passages: The Oceanic Voyage as Social Process (July 12 – 16).

The interdisciplinary conference will be held at the Fremantle Maritime Museum and build on its predecessor, Sea Changes: Historicizing the Ocean c. 1500 – c. 1900, held at the University of Greifswald, Germany, in 2000.

The aim of the conference is to explore the social and cultural transformations caused by the transport of labour, unfree and free, around and across the Atlantic, Indian, and Pacific Oceans.

The title is taken from the infamous African slave trade -- an enduring symbol of degradation. But now people are beginning to understand that between the decks of these vessels of howling misery lay creativity, something new: the origins of defiant, resilient, life-affirming African-American and Afro-Caribbean cultures.

The conference builds on, and hopes to expand, exciting new scholarship on the diverse men and women who laboured and travelled in ships around the world.

The Institute will facilitate a four-day conference on nanotechnology, The Building Block for Tomorrow’s Advanced Technology, from July 17 to 20 on campus.

Together with Edith Cowan University, the Australian Nanotechnology Network and Advanced Nanotechnology Limited, the workshop is designed to enhance Australia’s research capability in this specific field, to foster work across traditional academic boundaries, and to establish and invigorate interactions among various groups engaged in research both in Australia and overseas.

As well as new research and fundamental scientific principles, the program will include important social and technological issues related to nanotechnology, the scientific investigation into materials and devices with dimensions approaching a billionth of a metre in size.

The symposium will focus on building an understanding of the variety of sciences encompassed in the term nanotechnology, with workshop sessions, plenary lectures and research posters, allowing all participants to present their work.
A UWA geographer is one of a team of volunteers which is carrying on the work of WA’s founding Surveyor General, John Septimus Roe.

During his 40 years in the Survey Office, Roe had attempted to transcribe every journal of exploration in Western Australia from 1827. But when Roe retired in 1870, that single, comprehensive collection of reports was no longer maintained. Now, more than a century later, a team of volunteers has taken the early work of Roe, added to it and expanded it, to produce an edited volume of Western Australian Exploration 1826-1835. The book was launched by His Excellency the Governor on Foundation Day.

Marion Hercock, an adjunct research fellow in the School of Earth and Geographical Sciences, wrote the introduction to this first volume. It features the reports and diaries that narrate expeditions of exploration in WA, and is probably one of the most significant archival research undertakings in Australia since the collation of the Historical Records of Australia series. Published by Hesperian Press with the Department of Land Information and the Heritage Council of Western Australia, the book is the work of unpaid volunteers, the Explorers’ Diaries Project.

A geographer and public policy analyst, Dr Hercock’s research interests are in the history of geographical thought, exploration and environmental history, and she is the director of Explorer Tours, an educational company which specialises in following the routes of the early explorers.

Western Australian Exploration 1826-1835 brings together, for the first time, known and previously unknown material gleaned from letters, journals, official reports, newspaper articles and rare books. Dr Hercock said that physically scattered archives had been integrated into a coherent format that everybody in the community, not just the research professions, could access.

She said expantatory footnotes and appendices were included in the book to help the modern reader interpret and better enjoy the original 19th century manuscripts.

“Each report is a snapshot of the environment at a particular time and place, and therefore serves as a base line for analyses of environmental change and comparisons with modern conditions,” Dr Hercock said.

The reports also point to the past presence and distribution of plants and animals, and the existence of saline streams long before clearing for agriculture.

From the evidence it would be possible to map the earliest documented extent of bird species such as the bronze-winged pigeon.

“Equally interesting are numerous comments on the spread of cattle. In fact, it wasn’t the colonists who expanded the frontier, it was their cattle!”

Dr Hercock is continuing to work as a volunteer on the Explorers’ Diaries Project and has called on fellow UWA geographers Dr Vivian Forbes and Dr Patrick Armstrong, as well as geologist John Glover, to join in the preparation of subsequent volumes.

How much lupin grain is too much?

If sheep were human, they might be reaching for the antacid after a good feed of lupin grain.

Agriculture student Kelly Guest has won a scholarship to assist her with her Honours project to look at the effect of lupin species on acidosis in sheep.

The Frank Broomhall Award encourages agricultural students in their Honours year. It is awarded to students who have a co-supervisor in the Department of Agriculture (DAWA). Kelly’s supervisors are DAWA’s Robin Jacob and senior lecturer in Animal Biology, Dr Phil Vercoe.

Her project will be a collaborative effort with UWA, DAWA and Murdoch University. Kelly will examine three hypotheses relating to the concept that lupins can cause acidosis, which occurs when excessive amounts of lactic acid are produced.

The study will assist farmers in determining mixed feed rations and the optimal length of time stock need to adjust to the feed rations.
Forget the Myer and David Jones sales! Perth’s most anticipated sale each year is THE SAVE THE CHILDREN BOOK SALE in the Undercroft of Winthrop Hall in July.

The University branch of Save the Children is still happy to accept donations of books, CDs, DVDs, videos, records and sheet music at their depot on the corner of Underwood Avenue and Brockway Road in Floreat (the northwest corner of the University’s Shenton Park research station). If you can’t get there, pick ups can be arranged by calling 9440 6411, 9312 3119 or 9385 9070.

This year, the sale will open on Friday July 15 and run until Wednesday July 20. On Saturday, July 16, the ABC morning program will broadcast from the Undercroft, with radio presenter Marshall Martin encouraging listeners to join the throng of book lovers.

Money raised from the sale helps disadvantaged children both in Western Australia and throughout the world.

**CLASSICAL TOUR**

**THESEUS AND THE MINOTAUR**

Would you like to relive some of the most exciting Greek myths? You have the chance later this year, with the University’s expert on classical Greek.

In line with the recent successful tours organised by the Roman Archaeology Group, Classics and Ancient History will present a tour of Greek sites in October.

It is being organised and led by Associate Professor John Melville-Jones, and will concentrate on sites connected with the legendary hero Theseus of Athens. In addition to Athens, the group will visit Crete, where Theseus killed the Minotaur in the Labyrinth; the island of Naxos where he abandoned Ariadne; and the island of Skyros where he died.

The tour will depart on October 13 and return on October 29. The cost will depend on the number of participants, but will be in the range $5,500-$6,000.

For further information call A/Professor Melville-Jones on 6488 2164 or email jrmelvil@cyllene.uwa.edu.au

Health experts are urging West Australians to take up the challenge and become ‘heroes’ for Red Nose Day 2005 on Friday June 24

SIDS and Kids education programs since 1991 have saved more than 4,000 babies from sudden and unexpected death, including from SIDS.

“Saving lives is our number one goal – if we are to continue to do that for parents into the future, we’ll need all West Australians to be heroes this Red Nose Day by digging as deep as they can,” said Angela Doyle, from WA SIDS and Kids.

Money raised is used to deliver the Safe Sleeping Community Education Program which has reduced the incidence of SIDS (Sudden Infant Death Syndrome) by more than 80 per cent since its introduction in 1991.

Funds also allow for the provision of free grief support 24 hours a day, seven days a week to people who’ve lost a child from conception to the age of 12. SIDS and Kids WA now offers the support to anyone who has experienced the sudden and unexpected death of a child, including from miscarriage, stillbirth, neonatal death, SIDS, sudden onset illness and accidents.

Red Nose Day funds are also channelled into research looking at the causes of child mortality, including childhood cancer.

**Agriculture Western Australia**

Dr M Sweetingham, Prof Kadambot Siddique, Centre for Legumes in Mediterranean Environments and Agronomy: ‘Yellow Lupin Improvement’—$26,000 (2005-09)

**Arthritis Foundation of WA**

Dr Jiale Xu, A/Prof David Joyce, Surgery and Pathology, Medicine and Pharmacology: ‘Inhibition of RANKL-Induced Osteoclastogenesis Through Modulation of NF-KB Signalling Pathways by Protein Kinase C Isoforms and by Parthenolide’—$20,000 (2005)

Dr Silvana Gaudieri, Dr Ellie Koredenwych, Dr N McHugh, Anatomy and Human Biology, External: ‘Influence of MHC and Killer Ig-like Receptor Haplotypes on the Susceptibility to and Severity of Psoriatic Arthritis’—$39,800 (2005)

**Australian Child and Adolescent Obesity Research Network (ACAORN)**

Ms Susan Byrne, Psychology: ‘ACAORN Longitudinal Studies Special Interest Group’—$3,750 (2005)

**Australian Lung Foundation**


**Australian Nuclear Science & Technology Organisation**

Dr Robert Woodward, Physics: ‘Clustering in Magnetic Bulk Metallic Glasses’—$8,100 (2005)

**Australian Research Council Linkage, Barmacino Limited**


**City of Wanneroo**

RESEARCH GRANTS & CONTRACTS
continued

CRC FOR VALUE ADDED WHEAT
A/Prof Wallace Cowling, Plant Biology, Faculty of Natural and Agricultural Sciences:‘Skilled Graduates and Undergraduates for Industry Succession’—$20,000 (2004-07)

CRIMINOLOGY RESEARCH COUNCIL CANBERRA

CURTIN UNIVERSITY-ADMINISTERED ARC

CYSTIC FIBROSIS FOUNDATION (UJ)
A/Prof Peter Sly, UWA Centre for Child Health Research: ‘Cystic Fibrosis Foundation—Hygienic Research Grant’—$486,000 (2005-08)

DEPARTMENT OF ENVIRONMENT, ALBANY
Dr Craig Russell, Faculty of Natural and Agricultural Sciences: ‘Triggers to Algal Blooms in Lake Powell’—$7,210 (2005)

DEPARTMENT OF HEALTH AND AGEING: MISCELLANEOUS
Prof Gary Hulse, Dr Diane Arnold-Reed, Mr Robert Tait, Psychiatry and Clinical Neurosciences: ‘Blood Naltrexone Levels Over Time Following Naltrexone Implant’—$19,481 (2005)

DEPARTMENT FOR PLANNING AND INFRASTRUCTURE
Dr Ian Eliot, Dr Matthew Tonts, Mr John Collins, Mr Grant Walsh, Earth and Geographical Sciences: ‘Beach User Study’—$113,740 (2005)

DEPARTMENT FOR PLANNING AND INFRASTRUCTURE, MARINE SAFETY DIRECTORATE

BEST INTERNATIONAL SCIENCE LINKAGES PROGRAMME
A/Prof Xiao Hu, Mechanical Engineering: ‘Hybrid Al2O3-SiC-YAG-ZrO2 Ceramic Nano-composites for High Temperature Applications’—$26,000 (2005)

Dr Yinong Liu, Mechanical Engineering: ‘Ceramic-Shape Memory Alloy High Toughness Composite Materials’—$26,400 (2005)

Dr Yinyong Liu, Mechanical Engineering: ‘Magnetically Controlled Shape Memory Materials’—$25,700 (2005)

DECEL LIMITED
Dr Dominique Blache, Animal Biology: ‘Quantification of the Expression of GH Receptor and IGF-1 mRNA in Cows’—$47,928 (2005-06)

GASTROENTEROLOGICAL SOCIETY OF AUSTRALIA (GEA)
Dr Malcolm Lyons, UWA Centre for Medical Research: ‘Identification of Genes for Cholesterol Gallstone Susceptibility’—$50,000 (2005-06)

GRANTS R&D CORPORATION
Dr Jonathan Clements, Centre for Legumes in Mediterranean Agriculture: ‘Travel - 11th International Lupin Conference’—$4,290 (2005)

Dr Penelope Smith, Centre for Legumes in Mediterranean Agriculture: ‘Travel - 2nd Australian Model Legume Workshop, Application to Crop and Pasture Improvement’—$5000 (2005)

Dr Kathrynn Steadman, Plant Biology: ‘GRDC Travel - Attend 8th International Workshop on Seeds, Brisbane, May 2005’—$1,429 (2005)

GREAT SOUTHERN DEVELOPMENT COMMISSION
Dr Craig Russell, Dr G Lee, Faculty of Natural and Agricultural Sciences, External: ‘An Evaluation of Water Conditioning to Mitigate Salinity’—$2,000 (2005-06)

GREENING AUSTRALIA
Dr Geoff Woodall, Faculty of Natural and Agricultural Sciences: ‘NLP Natural Resource Innovation Grant - New Crops and Systems’—$38,000 (2005)

Dr Geoff Woodall, Faculty of Natural and Agricultural Sciences: ‘Strengthening the Developing Sandalwood Industry Across Regions to Achieve Biodiversity, Profitability and Social Targets’—$42,152 (2005)

HEALTH DEPARTMENT OF WESTERN AUSTRALIA
Dr James Emmens, Dr Robert Ahlken, Dr Frank Sanfilippo, Ms Jennifer Mountain, Mr Aqif Mukhtar, Prof C D’Arcy Holman, Population Health, Surgery and Pathology: ‘Safety and Quality in Surgical Care: The Development of the Western Australian Audit of Surgical Mortality’—$250,000 (2004)

LOCAL GOVERNMENT MANAGERS ASSOCIATION
Associate Professor Timothy Mazzarol, Graduate School of Management: ‘LGMA Sustainable Workforce Proposal’—$5,000 (2005)

UNISTRUCTURAL ANALYSIS NETWORK ORGANISATION (NANO)
Dr Charles Musca, Mr Richard Sewell, Dr Richard Stern, Electrical, Electronic and Computer Engineering, Centre for Microscopy and Microanalysis: ‘NanoSIMS for Analysis of HyCoTe Semiconductor Material’—$1,800 (2005)

NATURAL HERITAGE TRUST
Dr Geoff Woodall, Faculty of Natural and Agricultural Sciences: ‘Integrating Woody Perennials Into Saltland Grazing Systems’—$13,120 (2005)

NORGES GEOTEKNIKES INSTITUTT (NGI)
Prof Mark Randolph, Centre for Offshore Foundation Systems, Civil & Resource Engineering: ‘Shear Strength Parameters Determined by In Situ Tests for Deepwater Soft Soils’—$175,555 (2005)

NHMRC: EQUIPMENT GRANTS
Prof Geoffrey Stewart, Dr Nithiananthan Asokanathan, Dr Peter Henry, Prof Howard Mitchell, Biomedical, Biomolecular and Chemical Sciences, Medicine and Pharmacology: ‘SPECTRAmx 190 Microplate Reader’—$16,500 (2005)

NHMRC TRAINING FELLOWSHIPS
Dr Jason Kirkness, Anatomy and Human Biology: ‘NHMRC CJ Martin Fellowship - Neurohumoral and Neuromuscular Control of Upper Airway Patency In Severe Obesity and Sleep Apnoea’ (2005-08)

Dr Louisa Macdonald, UWA Centre for Medical Research: ‘NHMRC Biomedical (Peter Doherty) Fellowship’ (2005-07)

NOVOCEN RESEARCH PTY LTD
Dr Suzanna Temple, Medicine and Pharmacology: ‘Contract Research Agreement Number NV04.34’—$14,040 (2005)

OFFICE OF CRIME PREVENTION
Dr Ian Dadour, Dr D Berryman, Anatomy & Human Biology, External: ‘Detection, Characterisation of DNA Fingerprinting in Crime Scene Samples for Forensic DNA Profiling’—$99,000 (2005-06)

PFIZER PTY LTD
Dr Christopher Beer, Prof Ian Puddey, C/Prof Graeme Hankey, C/Prof Makhen Khangure, Medicine and Pharmacology: ‘Improving Patient Outcome After Acute Ischaemic Stroke. A Placebo-controlled Study to Test the Effectiveness of Atorvastatin and Irbesartan in Acute Ischaemic Stroke’—$35,000 (2005)

PILBARA IRON CO (SERVICES) PTY LTD
Dr Pauline Grierson, Plant Biology: ‘Mulga Regeneration in the Central Pilbara Region of Western Australia’—$144,000 (2005-2007)

SOCIETY OF ECONOMIC GEOLOGISTS INC

SOLBEC PHARMACEUTICALS LTD

WALLATIN WILDLIFE AND LANDCARE INC EX GRDC
ENGINEERING GRADUATES

BJ Process and Pipeline Services are the world’s largest commissioning and pre-commissioning services contractor to the oil & gas industry.

With increased demands across our industry we require suitable personnel to fill the position below for our Asia Pacific operation:

**Graduate Mechanical Engineer**

- Graduates with up to 2 years of experience in the Oil and Gas industry are encouraged to apply. However this is not essential as BJ PPS also provides employees with training and a career advancement program.
- Good knowledge of preparation of project specific procedures, AutoCad, P&ID’s and a willingness to work at site locations offshore, onshore and overseas.
- The package would include a 6/2 weeks rotation out of Singapore.

Please forward your recent resume by email attention to:

Noor Ashikin – Human Resources
nashikin@bjservices.com.sg

Nadeem Regal – Human Resources
nadeemregal@bjservices.com.sg

DEADLINES FOR UWAnews

**WEDNESDAY** June 15 for June 27 publication

**WEDNESDAY** June 29 for July 25 publication

**WEDNESDAY** July 27 for August 8 publication

**WEDNESDAY** August 10 for August 22 publication

**WEDNESDAY** August 24 for September 5 publication

**WEDNESDAY** September 7 for September 19 publication

**WEDNESDAY** September 21 for October 3 publication

**WEDNESDAY** October 5 for October 17 publication

**WEDNESDAY** October 19 for October 31 publication

**WEDNESDAY** November 2 for November 14 publication

**WEDNESDAY** November 16 for November 28 publication
NEWS

THOUGHT PROVOKING AND CHALLENGING
Free Public Lecture
Thursday, June 23, 2005 at 6.00pm

“Wellbeing: Is It the Colour Green?”

Dr Norman Swan, multi-award winning producer and presenter of the ABC’s Health Report will speak about what wellbeing means and what determines it. He will then chair a panel of 6 to discuss the latest research results … which may surprise you!

Part of the “Sustainable Subiaco” Speaker Series sponsored by the Centre for Water Research at the University of Western Australia and the City of Subiaco.

At the University Club Theatre Auditorium, 1st Floor, University Club, Entrance Number 1, Hackett Drive. Bus numbers 102, 103, 107, 25 and 24

Call or email today to reserve your seat as numbers are limited.

Cindy Siano CindyS@subiaco.wa.gov.au  Phone 9237 9271
Caroline Wood wood@cwr.uwa.edu.au  Phone 6488 2466

SCIENCE NETWORK WA (www.sciencewa.net.au) with support from the Institute of Advanced Studies, UWA presents a FREE public event

Science: has it gone too far?

Embryo stem cells, mice that glow in the dark, Frankenfood, cloned pets, superdrugs no-one can afford, nanobots that spy on you, global warming, foetal screening, military swarms has science completely lost the plot? Is today’s science out of step with society values and out of control? Who is really calling the shots? Has the public any say or are they just the suckers who pay for the next bizarre technology in more ways than one?

Award winning journalist Julian Cribb will join top WA researchers in a panel of 6 to discuss the latest results … which may surprise you!

Professor Alan Harvey, Chair, Scientific Advisory Committee for the WA Reproductive Technology Council & Chair, UWA Neuroscience Discipline Group

Professor Stuart Bunt, Scientific Director, SymbioticA & Professorial Fellow, School of Anatomy and Human Biology, UWA

Mr Richard Egan, President, National Civic Council (WA Branch)

Dr Stephen Millett, Executive Officer, Human Research Ethics Committee & Director, Centre for Ethics and Philosophy (Curtin)

Dr Bruce Bellinge, Director and Reproductive Biologist, Concept Fertility Centre

Associate Professor Tim St Pierre, Head, Biomagnetics Research Group & Associate Professor, School of Physics, UWA

COST: FREE

Please RSVP to philippa@scitech.org.au or (08) 9481 6295 by Tuesday June 21

For more information including maps of venues please visit our website www.ias.uwa.edu.au or contact the Institute of Advanced Studies on (08) 6488 1340; Email ias@admin.uwa.edu.au
**NEW STAFF**

Ruth Abbott, Administrative Assistant, Biomedical, Biomolecular and Chemical Sciences  
Dr Frank Bierlein, Senior Research Fellow, Earth and Geographical Sciences  
Sholeh Boyle, Project Officer, Surgery and Pathology  
Paula Caird, Research Assistant, Biomedical, Biomolecular and Chemical Sciences  
Mark David, Manager, Human Resources  
Richard De Trafford, Computer Services Officer, Primary, Aboriginal and Rural Health Care  
Dr Luc Delriviere, Associate Professor, Surgery and Pathology  
Merlyn D’Souza, Library Officer  
Jane Eckermann, Administrative Officer, Finance and Resources  
Christopher Ellis, Analyst/Programmer, Medicine and Pharmacology  
Dr Seng Khee Gan, Senior Lecturer, Medicine and Pharmacology  
Bernadette Grogan, Administrative Assistant, Medicine and Pharmacology  
Kate Hamersley, Project Officer, Lawrence Wilson Art Gallery  
Paula Heikkinen, Financial Aid/Housing Officer, Student Services  
Dr Natalie Jacobsen, Research Associate, Biomedical, Biomolecular and Chemical Sciences  
Dr Jason Kirkness, Research Associate, Anatomy and Human Biology  
Dr Vivienne Lawrence, Senior Research Officer, Psychiatry and Clinical Neurosciences  
A/Prof Lee Yong Lim, Associate Professor, Biomedical, Biomolecular and Chemical Sciences  
Samantha Millar, Administrative Officer, Dentistry  
Hannah Radley, Graduate Research Assistant, Anatomy and Human Biology  
Dr Jananne Raguragavan, Research Officer, Natural and Agricultural Sciences  
Adrian Ryder, Security Officer, Facilities Management - Security  
William Schaffer, Pool Supervisor, Human Movement and Exercise Science  
Pelling Tan, Research Officer, Women’s and Infants Health  
Jennifer Tasker, Graduate Research Assistant, Psychiatry and Clinical Neurosciences  
Vanessa Tysoe, Project Officer, Primary, Aboriginal and Rural Health Care

**REDACTED EQUIPMENT**

CONDITION refers to the general condition of item (1 = as new, 2 = good, 3 = serviceable, 4 = unserviceable) AGE refers to the nearest year.  
Schools are reminded that all university equipment available for sale must be advertised in the UWAnews. Receipts should be PeopleSoft account coded 490.  
CONDITION refers to the general condition of item (1 = as new, 2 = good, 3 = serviceable, 4 = unserviceable) AGE refers to the nearest year.  
Schools are reminded that all university equipment available for sale must be advertised in the UWAnews. Receipts should be PeopleSoft account coded 490.

<table>
<thead>
<tr>
<th>ITEM</th>
<th>PRICE</th>
<th>AGE</th>
<th>CONDITION</th>
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<tbody>
<tr>
<td>Carrier Portable Air conditioning Units (11) without hose/porthole</td>
<td>$165</td>
<td>$220</td>
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<tr>
<td>with hose/porthole</td>
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<tr>
<td>Netpro Desktop Intel Pentium IV 1.6 GHZ, 478 PIN CPU</td>
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<td>5x 17” Monitor</td>
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<td>Apple Laserwriter 12640 printer</td>
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<td>3 x item 100 COMPAQ Armada E500 PIII 1Ghz</td>
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<td>15” monitor</td>
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<td>15” monitor</td>
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<td>1 x item 800 IMC media Converter</td>
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<td>1 x item 1500 Acer AC701 17” CRT Monitor</td>
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<tr>
<td>1 x item 1700 Phillips 77c 17” CRT Monitor</td>
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<td>4 x item 1800 Manual printer switch box</td>
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<td>1 x item 1900 COMPAQ Armada E500 PIII 1Ghz</td>
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<tr>
<td>3 x item 2000 ACER VERITON 5100 PIII-733 15” monitor</td>
<td>Offers 7 4</td>
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Try to imagine having to spend all your next pay, and more, just buying enough water for your family to drink, even with the town water supply connected to your house.

In Pakistan and many other parts of the world, even in some parts of Europe, there is a drinking water crisis. There is plenty of water: the crisis lies in the hidden cost of distribution and making it drinkable. Few of the expensive town and city water distribution networks reliably deliver clean, clear and safe drinking water.

When you really need water in summer or drought conditions, as often as not, the tap sucks air in when you open it. When the water does flow it is unsafe to drink without first boiling and filtering it. To find the real cost you have to add the household labour and energy costs to the bribes you have to pay to the water truck drivers to bring water when you need it.

Even at the lowest earning rates, the final cost can be 30 times as much as we pay for water in Perth. For a poor family, the minimum they need in summer (10 litres per day per person) could cost more than their entire income.

The consequence is obvious: they cannot afford safe drinking water. People fall sick and children die because of pathogens in the water that they have to drink.

Doctors in Pakistan have told me that most of the health problems they see are caused by not washing hands. Understanding the cost of even unsafe safe drinking water provides the explanation. Water is often too expensive for poor people to be able to afford to wash their hands.

The technology of water supply seems to be simple and basic engineering: dams, pipes, pumps, taps. Yet, if this is true it is hard to understand where the problem lies. Why should water, the most basic commodity needed to support human life, be so expensive? Why should it be so much more expensive in a poor country than in a wealthy country, in real dollar terms?

I was only recently made aware of this water problem, quite by chance through my research on simple technologies to help solve landmine clearance problems. I have found that it is difficult to introduce even the simplest technological or efficiency improvements into demining operations in the Third World. In Croatia where hourly labour costs approach European rates, demining is actually less expensive than in Afghanistan and Cambodia.

Water supplies and landmine clearance both involve engineering. I began to realise that there might be something different about the way that engineering happens in Third World countries that might explain these surprising and counter-intuitive cost differences. I set up a research project to look at the differences in engineering practice between Pakistan and Australia. I asked the question “What do engineers do in Pakistan that is different to what they do in Australia?”

Then I ran into an unexpected problem. It turns out that we know almost nothing about what engineers really do, even in a country like Australia. The real nature of engineering work is not well understood, even by most engineers. There is nothing new about this. A comprehensive description of how the great monuments of Egypt were constructed seems to be one of the most obvious and intriguing gaps in the hieroglyphic records of the time.

Our research is beginning to tell us that much of the work of engineers involves the coordination of other people over whom they have no direct control. An engineer is nowhere in sight when the water pipe is connected to your bathroom tap. In all likelihood no engineer ever touched the water main that burst under the Kwinana Freeway or the sewage pipe in Victoria Park. Yet we presume (correctly) that this is the work of engineers. Most engineers develop and organise technical products and services with predictable cost, timescale, performance and service life. However, these products and services are almost always delivered through the hands of other people.

Engineering is an intrinsically technical discipline. Yet, even though students may not know it, it is a social discipline at the same time. Perhaps by understanding this we can begin to understand why water is so expensive in poor countries. Engineering may yet lie at the heart of real solutions to poverty but only if we understand its true nature.