

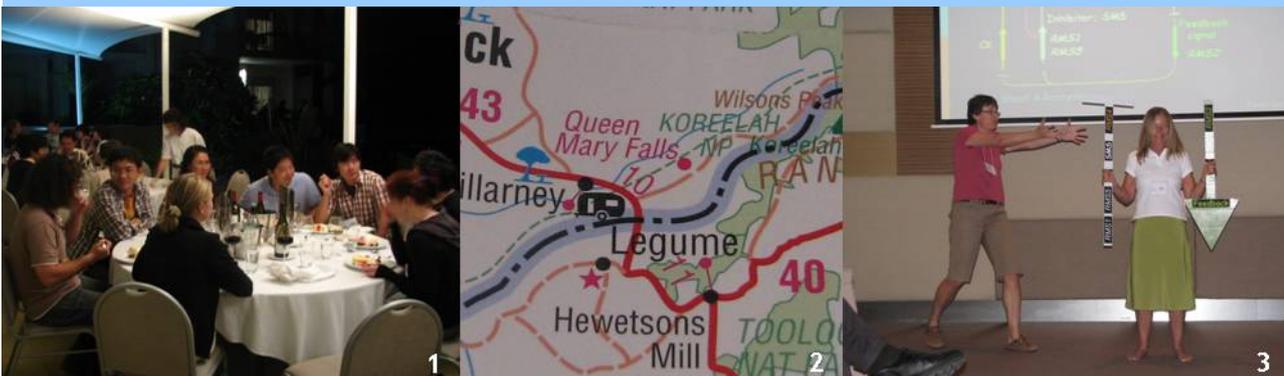


## Legumes seasoned with Pepper and Salt

The 2007 CILR Annual Symposium, held at Peppers Salt Resort and Spa from the 11th-14th of April, was an event enjoyed by all. The beautiful resort and picturesque surrounds of the NSW north coast complemented three days of seminars, networking, poster presentations, and scientific discussions.

Each year the CILR Annual Symposium provides opportunities for staff and students from different nodes to interact, discuss their current work and meet international experts in the field of plant science. This year was no exception. The symposium was attended by members of the international Scientific Expert Advisory Committee (SEAC), Centre Advisory Board (CAB), CILR associates, CILR administration and scientific staff, and PhD and Masters students. Over 80 delegates attended the three days. Seminars were presented by our guests: Prof. Noel Ellis (John Innes Centre, UK), Prof. Gina Hernandez (Centre de Ciencias Genomitas-UNAM, Mexico), Prof. Ueli Grossnikolaus (University of Zurich, Switzerland), Prof. John Manners (CSIRO, Brisbane), Dr David Bird (NCSU Raleigh, USA), Prof. Craig Atkins (UWA, Perth), Dr Bruce Wicking (Synthesis Energy, Melbourne), and Dr Kay Taylor (UniQuest, Brisbane). In addition, a large number of seminars were presented by Centre post-doctoral research scientists and graduate students. This wide range of seminars from different delegates enabled thorough dissemination of new knowledge and information on current research projects. Topics discussed during the various seminars focused on bioactive molecules in plants and animals, meristem transcriptomes, bioinformatics and computational science, Pongamia and the newly emerging biodiesel industry, nodulation and autoregulation, embryo development, miRNA regulation, and the CILR's patented angiogenesis technology.

Peppers Salt Resort and Spa provided the perfect ambiance for in-depth scientific discussion, networking and meetings. Together with numerous pools, bikeways, walkways, and of course the beach, the venue met all requirements for a scientific retreat: tables and lounges in the lobby and on the patio were useful workspaces and meeting areas; Roughie's Restaurant saw break-out groups discussing flavenoids and embryogenesis over breakfast; poolside deckchairs ensured peace for last-minute seminar practices and powerpoint tweaks; cocktails and hors d'oeuvres served during poster viewing sessions facilitated networking; comfortable beds awaited in the evenings by which to regain cognitive energy; and finally catering provided delicious food to ensure energy levels remained high, with the Thai Buffet dinner being a favorite.



# Legumes Seasoned With Pepper and Salt

Highlights of the symposium include: unveiling the CILR 2006 Annual Report; Dr Christine Beveridge's light hearted talk titled "Don't shoot the messenger—an after Easter play on words" which saw a human demonstration of branching in response to external stimuli (fortunately 'wild-type' Kerry Condon only endured a 'flash of lightning', as branching after decapitation was not being demonstrated); Karsten Oelkers seminar introduction showing a nearby town called Legume; and an overview of the current market forces affecting the newly emerging biodiesel industry.

Special thanks go to both Dr Alvin van Niekerk and Melisa Lewins for organizing the symposium; choosing the venue, arranging the program, selecting the food and wine menu, and generally enabling everybody to escape, retreat and learn.



Images from the CILR 2007 Annual Symposium: 1 Students and staff enjoying a Thai Buffet dinner. 2 A town nearby aptly named Legume (courtesy of Karsten Oelkers). 3 & 4 'Wild-type' Kerry Condon branching in response to external stimuli. 5 Prof. Ray Rose speaking with Ted Steele over dinner. 6 Sunrise over the Pacific Ocean (courtesy of Liqi Han). 7 Delegates listening to a seminar. 8 Prof. Noel Ellis speaks about the EU-GLIP program. 9 The swimming pool at Peppers Salt. 10 Conference dinner pool-side. 11 All staff and students of the ARC Centre of Excellence for Integrative Legume Research.

## Director's Report



We are approaching the end of an eventful year and it is time to reflect on it, not so much out of a sense of 'history' but to help us structure the future. This holds true for our individual lives as well as that within the Centre (often quite interlaced). Moreover, as a Centre we are also reaching the end of our first funding period, the episode that saw us create the application, the joy of award and the excitement of building and establishing the Centre as we have it now. 2007 gave us the extension (worth \$10 million altogether) which in the next 3 years will critically provide the opportunity to move our combined focus on legume science forward beyond the 2011 date. Critical in this push for future existence is our vision.

I just returned from the final review of the European Grain Legumes Integrated Project (GLIP) in Lisbon (their date of termination is February 9th, 2008). This project (funded with €14 million) produced outstanding advances that will serve global legume science for decades. Achievements include: *Medicago truncatula* draft genome (in collaboration with the US); a Tnt1 insertion population (based on *M. truncatula* variant 2HA, developed by our own Professor Ray Rose); a TILLING platform for both pea and *M. truncatula*; high through-put transcriptome analysis tools for either the entire genome or the entire transcription factor set (1800); bioinformatics and display activity of MapMan; and numerous specific advances dealing with biological questions relating to shoot branching (in collaboration with Dr Christine Beveridge), nodulation (again in collaboration with CILR researchers at both ANU and UQ), leaf, flower and tendril development, stem strength, seed composition, plant-pathogen interactions, food and feed quality, and molecular signalling mechanisms. Indeed a broad palette of achievements that required decisive coordination and communication to make an impact related to the investment. Note that I view funds spend on science as an investment.

It is hoped that several GLIP-induced projects will receive further funding on the national scale because of increased capability and assurance of delivery. The EU, in its 7th Framework Program, will attempt to fund 'new' projects at a smaller level (perhaps €3 million) characterised by excellence and European needs (often governed by a political and economic agenda!). Similar political persuasion must be nurtured in Australia, perhaps driven by needs of changing agricultural situations.

This brings us back to VISION. Our Centre started out demonstrating to the world the importance of legume science and the necessary level of integration of analyses from different biological processes, to advance the utility of legumes. We were amalgamated through a common set of values relating to science, education and society. I also felt that we were driven by a vision to show that 'lonely' legumes can contribute to a plant science world; a world influenced at the basic level by the weedy crucifer *Arabidopsis thaliana* and at the applied level by cereal research. I know that the CILR together with the GLIP and other projects around the world have placed legume research in a viable position within plant science. Any attempt of shaping a future vision and path to implementation will need to integrate the strength of where we are globally with the needs of the upcoming decade, as supported by the quadruple bottom-line.

This EPOD issue also marks the transition of some people who contributed to the Centre in different ways. Lisette, the editor and producer of this newsletter, will move back to a lower salary of a PhD student, studying science commercialisation. Prof. Barry Rolfe, our long term 'sheep-dog' (an internal CILR joke!) will cease his Deputy Directorship at the end of the year. We thank you all, Barry, for all the excitement and inspiration you have brought us. Professor Mohan Singh will fill this position and we all look forward to his own energy and continued pursuit of excellence in plant science. Above it all, we as a Centre (be it student, technician, postdoc, lab leader) must contribute to a new phase of the Centre, recognising our strength and building on the clear needs of the future. A clear vision and perspective will be needed. Quoting a family relative, who loved to clean his car's windscreen excessively: You cannot be optimistic with a misty optic! Happy New Year.

Peter M. Gresshoff  
Director, CILR.  
November 2007

If you are behind on your CILR reading, look no further than this new section of the ePod. Each ePod edition will list newly accepted or published CILR papers, keeping you up-to-date on the goings-on at each node. If you have recently had a paper accepted, please email the abstract and citation to Alvin: [a.vanniekerk1@uq.edu.au](mailto:a.vanniekerk1@uq.edu.au).

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- ◆ Estrada-Navarrete, G., Alvarado-Affantranger, X., Olivares, J-E., Guillén, G., Díaz-Camino, C., Campos, F., Quinto, C., Gresshoff, P.M. and Sanchez, F. (2007) Fast, efficient and reproducible genetic transformation of *Phaseolus* spp. by *Agrobacterium rhizogenes*. *Nature Protocols* 2:1819-1824. \*
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- ◆ Kam, J., Gresshoff, P., Shorter, R. and Xue, G. (2007) Expression analysis of RING zinc finger genes from *Triticum aestivum* and identification of TaRZF70 that contains four RING-H2 domains and differentially responds to water deficit between leaf and root. *Plant Science* 173:650-659.
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- ◆ Mulwa, R.M.S. & Bhalla, P.L. (2007) Assessment of clonal stability of in vitro regenerated shoots of *Macadamia tetraphylla* by RAPD analysis. *Australian Journal of Agricultural Research* 58:253-257.
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\* Denotes journal of impact factor greater than 5 according to ISI Web of Science Journal Citation Reports

## How To: Apply for an ARC Fellowship

Many of us are under the impression that Centre staff cannot apply for ARC Fellowships, which is true if the application is aligned with Centre objectives. However as Michael Sheahan found out, you may apply if your project is not already funded by the Centre. Michael was recently awarded an ARC Fellowship for research into Dynamics of Plant Cell Division: Discovering the Mechanisms of Organelle Inheritance. Here he shares his experiences on writing an ARC Discovery Project application and provides us with some tips for how to write our own.

The idea started when my supervisors suggested that I would be competitive to put in an ARC Discovery Project application - as at that point I had a reasonable track record relative to opportunity and of course had many exiting and important questions to answer. The Discovery Projects scheme provides funding for research projects that can be undertaken by individual researchers or research teams, with Australian Postdoctoral Fellowships being one type of fellowship offered within the scheme.

**Tip #1**  
Don't write a grant if you're half-hearted about it. It's too competitive and people are in there to get the funds, not just test the waters!

After the idea had been planted in my mind, I turned to the ARC website for more information. Most of my info I obtained there, however, some I also obtained by talking to others who had submitted ARC Discovery Project applications in the past. My application was one where I was the sole CI, because my track record was strong at the time of application. As the research I had been doing in my PhD was closely linked to the CILR goals, it was decided that I would apply as a Centre fellow; the ARC funds my salary and the Centre my research costs. Of course, it would be perfectly fine to apply as a non-centre fellow and get both your salary and research costs funded. I certainly can't say,

that the ARC would view Centre fellows more favourably than "stand-alone" fellows. From my position though, I simply couldn't justify saying that my research for the past four years was integral to the Centre and then suddenly not when moving onto the Postdoc.

My whole application took about a month and a half to write, I think because it was the first time I've written a grant application and also I was trying to plan out exactly what I wanted to get across to the reviewers and ARC assessment panel. And then of course I edited it, edited it and edited it! The ARC helps by telling you how much each section is worth- for example, 40% for track record relative to opportunity and 60% for project design. Project design is broken into other areas, with

**Tip #3**  
Obtain exemplary copies of applications from your research office to have a look at the structure, how carefully they are worded and how the arguments are crafted.

allocation of worth to each subsection, for example methodology. I carefully read each section and ensured I addressed all these criteria accordingly and thoroughly. My mantra was that even if the application failed, it was an excellent opportunity to experience what is required to obtain competitive funding in Australia. Once I had a final draft, I had several people critically look over the application, give me their comments and help edit and make changes before I submitted it to the research office. The research office of each institute will have its own 'deadline' prior the actual submission to the ARC.

**Tip #2**  
Carefully read all the guidelines on the ARC website and address all criteria thoroughly.

Once I had the application approved by the research office, I entered the final version (parts A-D) into GAMS, for which you need to get a GAMS ID and password (obtained from your research office). From GAMS I printed out the application (RTF format), appended Part E (the actual research proposal) and interleaved other sections where required. This all happened by early March 2006. I then waited until June/July, when examiners comments become available, to which I made a strong and positive response (rejoinder). Then I played the waiting game; sat back and waited until the Science minister announced the outcome sometime last October.

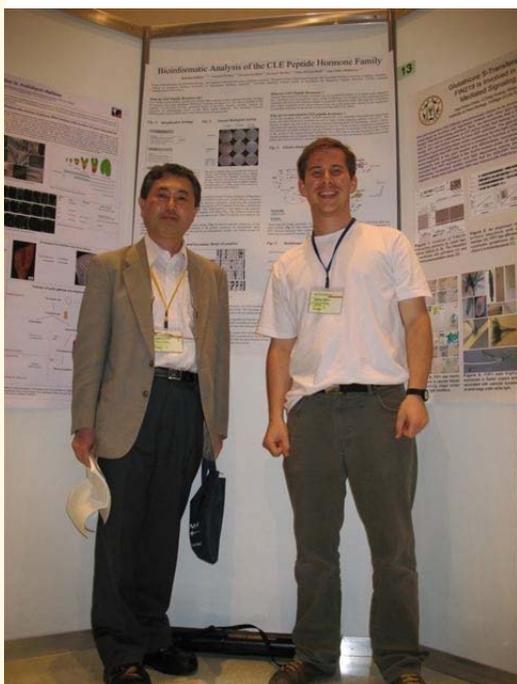
**Tip #4**  
If you include figures in your application, make them very clear, black-and-white, line drawings. The ARC scans the hard copy of your application to send out to examiners, producing an extremely low resolution document.

A copy of Michael's application can be obtained by contacting him directly at: [michael.sheahan@newcastle.edu.au](mailto:michael.sheahan@newcastle.edu.au)

## Report from the International Conference on Plant Vascular Biology in Taipei 2007

(Peter and Karsten at the 中央研究院)

I had the pleasure participating in the International Conference on Plant Vascular Biology 2007, from May 7-12 at the Academia Sinica in Taipei. The academia, which has its roots in the Chinese Academy of Sciences in Beijing, is one of the most reputable research institutions in Asia. The small scale of the conference and location in Taiwan (a perfect midpoint for people from Australasia, Europe and the Americas) resulted in the participation of 200 of the most eminent plant scientists from all over the world.



Professor Hiroo Fukuda from Tokyo University and I in front of my Poster

With the thematic focus on vascular transport, development and communication, the conference combined researchers from the Phloem and Xylem side for the first time. With Peter Gresshoff as invited speaker, our mission was to spread the word of the importance of legumes and the work of the Centre. Peter's talk presented results of the analysis of the *GmNARK* promoter and the interaction of the intracellular GmNARK domain with the Kinase Associated Protein Phosphatase (KAPP). It was a well received change for the majority of participants, who work primarily on *Arabidopsis thaliana* and *Poplar trichocarpa*. Interesting science was presented by many of the speakers; work on photosynthate fluxes (Norbert Sauer, Rainer Hedrich and Wolf Frommer), the world's most important plant hormone Auxin (Ottoline Leyser, Thomas Berleth and Rishikesch Bhalerao), as well as news on functions of class III HD-Zip transcription factors (Andrew Groover, Steven Clark, John Bowman and Dave Jackson). Particularly inspiring was the talk presented by Ykä Helariutta from Helsinki, who gave insights into the interaction of Cytokinin (CRE1) and microRNAs (miR165/166) in the specification of Protoxylem at the root apical meristem. I met many interesting personalities, such as Hiroo Fukuda (Tokyo), Steven Clark (Michigan) and John Bowman (Melbourne), from whom I received well appreciated feedback, in-put into my research and even interest for collabo-

ration. The conference was also an opportunity to meet with Anja Buhtz and Julia Kehr, some old friends from my time as an Honours student in Golm, Germany.

An organized conference trip enabled us participants to get a glimpse of the beautiful countryside of Taiwan. Evenings were not just useful for networking, but also to explore the vibrant city of Taipei with its many sights (e.g. the Taipei 101 Tower, the Chiang Kai-Shek Memorial, and Taipei's popular night markets). For first-time Asian travelers like myself, eating in a local, "non-touristy" area was a real adventure, but usually a good one. Taken together with the hospitable Taiwanese (although communication was often restricted to sign language) I will hold Taiwan and its people in happy memories. The next conference in three years time will be held in the United States, probably a much less inspiring environment. However, if the good organization and participation continues, it will certainly be worth a visit.



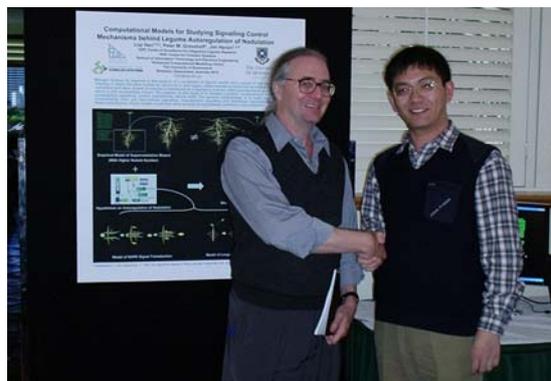
Peter and I with two local waitresses wearing a traditional Bavarian costume in a German style Beer Bar in Taipei

For more information visit: <http://sym.abrc.sinica.edu.tw/~plant2007/Invitation.html>

## The 8<sup>th</sup> Asia-Pacific Complex Systems Conference

The 8<sup>th</sup> Asia-Pacific Complex Systems Conference was held on the Gold Coast, Queensland, from July 2<sup>nd</sup> to July 5<sup>th</sup> 2007. It was the key event on complex systems in the Asia-Pacific region this year, covering the design, development and application of complex systems for different purposes. Differing from traditional mathematical modeling, which tries to find answers by simplifying complexity, complex systems is a systematic approach to study how the interactions between a system's parts and its environment lead to emergent system behaviors. For example, the regulatory systems of plant development and function are complex systems that involve signaling mechanisms inside and outside plants, giving rise to the emergent phenotypes or behaviors. Computational Modeling for Biology and Chemistry, Complexity in Energy, Water and Urban Development, Complex Systems in Earth Sciences, Complexity in Social Science, and Complexity in Business and Economics were among the major themes of the conference.

Day one of the conference provided a set of tutorial programs, of which I attended "Non-linear dynamics: From chaos to fractals to fractional calculus" and "How might biological learning relate to machine learning?". On day two I attended a series of keynote talks and other presentations about current research on complex systems. On the third day I presented my project within a poster highlight talk and a poster session. Some audience members were interested in the general methodology and modeling approaches of this work. But the most interesting question I received was about the practical application of the soybean supernodulation mutant: how farmers could use the mutant to improve agricultural production and if the weeds can have mutants with nodulation to fertilize the fields. Another interesting question was if the plant signaling systems can offer ideas to the social network regulation.



The conference chair Professor Peter Lindsay (left) and Liqi Han (right) in front of Liqi's poster.

Four days of learning and talking have greatly enhanced my understanding of complex systems. Furthermore it bolstered my belief that the systematic modeling would surely lead to a better investigation on the complexity involved in plant signaling mechanisms.

## Yu-Hsiang visits Academia Sinica



In June this year UQ node PhD student Yu-Hsiang Lin (left) visited Academia Sinica in Taipei, Taiwan. Academia Sinica is Taiwan's national research academy, comprising 25 separate institutes, of which 12 are science related. Yu-Hsiang presented his work detailing soybean feeding experiments during a 1 hour seminar at the Agricultural Biotechnology Research Centre (ABRC), within the Institute of Chemistry. The ABRC's work focuses around two topics: integrative plant stress; and herbal medicine. Research into integrative plant stress looks at plant resistance to heat, cold, nutrients and heavy metal toxicity. The herbal medicine group looks at extractions and fractionates of certain plant species known for their anti-cancer properties. Two key researchers located at the ABRC are Dr Yee-Yung Charng (formerly of UCLA) and Dr Tzyy-Jen Chiou (formerly of the Noble Foundation). Dr Charng is investigating the thermal tolerance of heat shock proteins and Dr Chiou is investigating phosphate starvation.

For more information about the Academic Sinica or its researchers, please visit: [www.sinica.edu.tw](http://www.sinica.edu.tw)

## 24th Annual Missouri Plant Biology Symposium and Noble Foundation Visit

I have recently returned from a trip to the USA where I visited the Noble Foundation and attended the 24th Annual Missouri Plant Biology Symposium: Plant Protein Phosphorylation-Dephosphorylation at the University of Missouri. I would like to share my experience with members of the CILR .

After the long flight from Brisbane to Dallas (via Los Angeles) and a two hour car journey from Dallas airport, I arrived at the Noble Foundation in Oklahoma State. After a day to adjust to USA time, I visited the Foundation on the 21st May. Dr Teal Pemberton, Director of Human Resources, who visited the CILR



Akira in one of the labs at the Noble Foundation

earlier this year, took me on a tour of several buildings, including the Plant Biology and the Forage Improvement buildings, and provided an overview of the Noble Foundation. After a short introduction, I attended a group meeting held every week. Interestingly, some groups presented research progress on the Kudzu plant, which belongs to the legume family and is popular in Japan as material for Japanese traditional sweets. After the meeting, Dr. Elison Blancaflor took me on a more detailed tour of the Foundation; labs and the huge glasshouses. We visited the many growth cabinets underneath one of the buildings, space which can also be used as a shelter against tornadoes. Indeed, the facilities, equipment and professional environment is notable. After the tour, I had meetings and discussions with Dr. Michael Udvardi and Dr. Lloyd Sumner. The Noble Founda-

tion is one of the most advanced institutes in the area of plant research and is still expanding. I declare it is worthwhile to visit and see the institute with your own eyes.

I then flew to St. Louis, Columbia, to attend the 24th Annual Missouri Plant Biology Symposium: Plant Protein Phosphorylation-Dephosphorylation and the Plant Proteomics Mini-Symposium at the University of Missouri, from 22nd to 25th May. This symposium is held every year focusing on different topics. More than 200 delegates came together to give talks or to present posters. Hot topics in this area are Mitogen Activated Protein (MAP) kinase cascade and brassinosteroid pathways in plants. Exciting talks related to these two topics were mainly presented on the first and second days. More general and technical presentations were shown on the third day. One useful new technique presented was band shift assays which measure the phosphorylation status of proteins using simple equipment such as a mini-gel tank. During the symposium I also had time to meet Prof. Gary Stacey and his co-worker Sandra Thibivilliers, and I looked around their lab and held discussions with some scientists there.



Akira(C), Prof. Gary Stacey(R) and Sandra Thibivilliers(L)

I would like to extend my appreciation to the CILR and the School of Integrative Biology for providing me with this great opportunity to visit the Noble Foundation and attend the Symposium. I really had a wonderful experience in the USA and it will surely make me a better scientist.

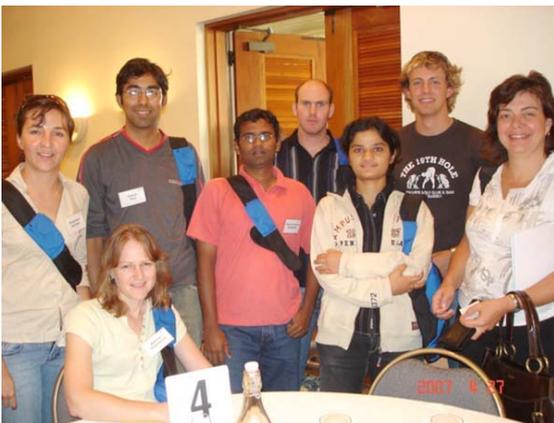
For more information on the Noble Foundation visit [www.noble.org](http://www.noble.org); For more information on the 24th or 25th Annual Missouri Plant Biology Symposium visit [www.plantgroup.org/symposium](http://www.plantgroup.org/symposium). The topic for 2008 is: **LIGHT, PLANTS, ACTION!**

## UniQuest Commercialisation Workshop

Research, teaching and service to the wider community are traditionally listed as the central missions of universities. Australia's national policies are directed at enhancing collaboration between the higher education sector and the industry. Research commercialisation is one of the key ways that publicly funded research can have a productive impact, by being translated into marketable products, processes and services. This is an important aspect of the Australian research and innovation system.

Bringing research results and outputs to markets in a timely and effective manner helps demonstrate the relevance and the value of that research, ensuring that it contributes to the economy and broader community.

UniQuest plays an important role in educating research students about commercialisation by conducting commercialisation workshops. These workshops are conducted every year and give students broader ideas about: What is research commercialisation? Why commercialise? What is the importance of commercialisation? How to commercialise? And What role does UniQuest play in research commercialisation?



One of the workshop groups with CILR students.

This year UniQuest's Research Commercialisation workshop was held at the Novotel Twin Waters Resort, Sunshine Coast, Queensland, from 26-27 April 2007. During the workshop students were separated into work groups supervised by a UniQuest manager. Speakers having vast experience in the field of commercialisation shared their experiences throughout the workshop. The workgroups were asked to select one of their projects and find ways to commercialise it as the workshop proceeded. At the end of the workshop groups were asked to prepare a four-minute "pitch" about how the project can be commercialised. Apart from having fun, UniQuest Commercialisation workshops are a good opportunity for research students to know the importance of research commercialisation and the ways to commercialise their research.

## CONGRATULATIONS!

Ray Rose for his recent promotion to Professor.

Dr Uli Mathesius for being awarded the prestigious Peter Goldacre Award for 2007.

Arief Indrasumunar, Ning Nontachaiyapoom and Jeanette Simmonds for submitting their PhD theses and passing!

Elizabeth Dun for submitting her PhD theses.

Michael Imelfort for completion of his Masters.

Satomi Hayashi & Sean Myers for graduating with first class Honours, and Meng-Han Lin, Tony Tif, Louisa Cowie, Sz Ying Lim, Jonathan Peters, Melina Aprelia and James Pai for submitting their Honours theses. Good Luck!

## The Climate Project

### CILR presents Al Gore's An Inconvenient Truth

The Climate Project (TCP) began in 2006 in Nashville, Tennessee, as a non-profit organization with the mission of increasing public awareness of the climate crisis at a grassroots level. Australia was the first country outside the USA in which Noble Prize winner Mr Al Gore chose to train presenters to enact this mission. CILR's Prof. William Grey is now a member of a group who have been trained and certified to present a version of the slide show on which Mr Gore's Academy Award-winning film, *An Inconvenient Truth*, is based.

After their training, TCP presenters return to their communities and are linked by the Australian Conservation Fund's website ([www.acfonline.org.au](http://www.acfonline.org.au)) to a comprehensive online support system and interactive community. They also have a professional team of online communications and education specialists, who provide support for their presentations and assist in organizing speaking venues, press releases, and other assistance for their volunteer work as messengers of change for the climate crisis.

The heart of TCP lies in the commitment, dedication and passion of TCP presenters to educate, encourage and increase dialogue about the climate crisis and its solutions. These solutions include exploring the need for new technologies to reduce our global carbon footprint and finding alternative energy sources to fossil fuels. In his talks on climate change Prof. Grey mentions the CILR research on *Pongamia pinnata*, a legume with high oil yield and potential for biodiesel production. *Pongamia* can be grown on marginal land and may have a role in reducing carbon emissions, thereby helping to address the problems of climate change.

## Functional Genomics Workshop

Held in July this year, the ANU Functional Genomics Workshop allows students to experience new techniques for analysing genes and genomes from a more systems based approach. New high through-put technologies of genomics, transcriptomics, proteomics and metabolomics were discussed, as were the bioinformatics required to interpret large amounts of data generated from these technologies.

Topics such as functional genomics approaches to plant energy metabolism, mass spectrometry (MS) for biologists, current tools and limitations of proteomics, the role of receptor kinases in stem cell biology and plant development, metabolomics, and bioinformatics were discussed. CILR's Peter Gresshoff, Charles Hocart, Uli Mathesius (see below), Chris Parish, and George Weiller, along with members of the Centre for Plant Energy Biology and RSBS, gave a combination of lectures and workshops over the three days.



## My Lab Supporting UQ Teaching and Learning with Interactive Dynamic Models

Jim Hanan, Christine Beveridge and Kim Nichols (UQ Department of Education) were recently awarded a UQ Teaching and Learning Large Strategic Grant for their My Lab project. This project will create a resource for development of computational models in collaboration with teaching and learning staff for UQ undergraduate subjects BIOL1020, BIOL1030, BIOL1040, CHEM1020, CHEM1030 and SCIE1000. The computational models will provide complex investigative environments suitable for inquiry based learning. Methods for promoting reflective inquiry to increase conceptual understanding of biological phenomena will be refined and rigorously evaluated. Models will be packaged for use and staff trained to attain maximum utility in improving student outcomes and satisfaction. These modules will form the foundation of the My Lab model repository. The mathematical basis of the learning activities in My Lab will have the dual advantage of providing a diversity of learning experiences, while underpinning the value of mathematics and computation in biology, thus meeting a key recommendation of the UQ BSc review. A key component of the project will be evaluation of pedagogical approaches to ensure improved student outcomes and satisfaction.

## Esteemed Scientists Share Their Wisdom

The UQ node has recently been visited by a number of highly regarded plant scientists.

In May this year, the German Ambassador to Australia, Dr Martin Lutz, visited the CILR for a lab tour and demonstration of *Pongamia pinnata* (see image right with Dr Paul Scott).

Professor Chris Lamb, director of the John Innes Centre in Norwich, UK visited the University of Queensland. During his visit he met with Prof. Peter Gresshoff and toured the Centre's facilities (see bottom left, with Dr Attila Kereszt and Prof. Peter Gresshoff).

In October Dr Giles Oldroyd visited both the UQ and ANU nodes presenting seminars. Dr Oldroyd spoke of the conserved signal transduction pathway responsible for recognition of the rhizobia Nod factor and micorrhiza Myc factor.



In November Professor Hans-Joerg Jacobsen from the University of Hannover presented a seminar on Grain Legume Transformation. He spoke of the different techniques employed and the difficulties in transforming *Phaseolus* species. Afterwards he spent the day at the UQ node talking with staff and students about their respective transformation protocols and any difficulties they may be experiencing (see right - discussing soybean transformation with Snow-Li).



Miles Holmes is a CILR PhD student investigating Indigenous Ecological Knowledge (IEK). His research is highly collaborative with the Lajamanu people (Warlpiri tribe) from the northern Tanami desert region of the Northern Territory.

In Aboriginal culture there are strict rules regarding the production and dissemination of knowledge. Lajamanu, like many central desert communities, is reaching a time when the elders who grew up 'footwalking' the Tanami desert are passing away. With them will go a detailed store of ecological knowledge. A consistently expressed issue is the necessity of finding ways in which IEK can be transferred from elders to younger people: inter-generational transfer. With this imperative in mind, my research has sought to facilitate and record viable ways of promoting this inter-generational transfer. What has emerged from the research are consistent statements from indigenous people that the most effective teaching happens 'on country'.

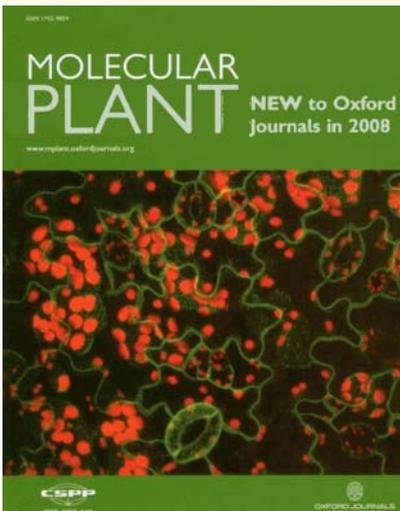
Thus, in August 2007 a 'country visit' was organised to the Mirridi outstation, 150 km southwest of Lajamanu. Lessons were a combination of formal tuition, practical experience, art, dance and metaphor. The pattern was to travel over country during the day, visiting sacred sites, hunting, tracking and looking at plants, then at night time conduct formal singing. In this format the Warlpiri have for many years created excellent naturalists. It is somewhat of a 'multimedia' approach to teaching IEK.

There is no category of 'ecological knowledge' taught separately from the totality of Warlpiri culture, in the way Westerners might study biology or botany as a distinct field of study. Instead there is a strong focus on relationships. For example, earlier in the year I had been told that when a particular Acacia (one of Australia's most iconic legume genus) comes into flower it is the start of the cold season. On this trip we stopped at the same species whose flowers were starting to shrivel and fall to the ground. This signals a time when the weather is getting warm, snakes are breeding and are particularly aggressive, and people out hunting should be careful for themselves and their children. Thus we see that information about the phenology of Acacias is linked to both the biology of snakes and the behaviour of humans, in one fluid lesson about relationships. This is a powerful principle in ecological understanding. Interestingly we now see a similar focus in the emerging field of complex systems science with regard to management of natural resources such as the Great Barrier Reef. These relationships, which often rely on subtle signals derived from practical experience, cannot be always translated easily into text. For this reason my thesis argues that it is very important to preserve IEK as a living adaptive knowledge in the minds of young people as well as in various media.



The importance of song was also highlighted on the trip. Song has often been overlooked in ethno-biological studies, however it is important in that it encodes specific information about species as well as showing relationships between those species, people and country. Songs are the stories of the dreaming ancestors who travelled the country, creating and naming the landscape, creating the social order and imbuing the world with their essence. They are still active in the landscape today. Most species are represented in Dreaming Narratives and certainly every plant I have brought forth has proven to have a song. Also represented is the land itself, often in the form of many place names that become maps of country, the stars, wind, rain, people, and the various kinship groupings that exist between them. Encoded in song are also ethics and codes of behaviour, principles of land tenure, and history. Through song young Warlpiri people are taught the place of a plant or animal in the context of the greater environment, as well as its place in Warlpiri beliefs and its metaphorical meanings.

*Continued page 14...*



## New Journal!

The Chinese Agricultural Academy of Science (CAAS) in collaboration with Oxford University Press has launched a new high quality journal, dealing with molecular and genetic aspects of plant growth, adaptation and development. The prestigious international editorial and advisory board, including the CILR director Peter Gresshoff, met earlier this year in Shanghai to finalise preparation for the launch and content of the first few theme-oriented issues (starting January 2008). Fast handling and an anticipated high impact factor rivalling *Plant Cell* and *Plant Journal* add to the attractiveness of this journal. The Brisbane node of the CILR already submitted a ground-breaking paper (Bandana Biswas et al.) on the first time isolation and associated characterisation of an ABA insensitivity mutant in *Lotus japonicus*. More details are available on the journal's website: [www.molecularplant.org](http://www.molecularplant.org)

## STEP IN LABS SHINES AGAIN

STEP IN LABS 2007 (Science Teachers Education Partnership IN Legumes And Biotechnology Studies), run for the second time following the success of STEP IN LABS 2006, is an innovative week-long teacher professional development workshop run by the CILR in partnership with Education Queensland (EQ).

STEP IN LABS 2007 provided nine senior biology teachers from throughout Queensland with new resources, ideas and an enthusiasm for teaching plant science, plant physiology, biotechnology, genetics, and hormone biology in their classrooms. Using leguminous examples such as pea (*Pisum sativum*) and soybean (*Glycine max*), teachers developed an appreciation for the integrative and cross-disciplinary nature of plant biology and biotechnology.

As in 2006, STEP IN LABS 2007 proved successful. STEP IN LABS is designed to increase awareness of the importance of legumes, showcase the sophistication of plant biotechnology research, inspire teachers to take



Craig & Kate measuring bud outgrowth on pea plants

their new enthusiasm back to the classroom, provide teachers with a both source of new teaching resources and a contact institution at the University of Queensland, enable teachers to gain experience in the cutting-edge techniques used in plant science today, and further teachers' knowledge and understanding of all aspects involved in plant biology and biotechnology. These overall aims are underpinned by an expectation that teachers will disseminate new information back to their students and other colleagues, to encourage students to pursue careers in plant science or other scientific disciplines and to encourage colleagues to implement plant science into their teaching modules.

Special thanks go to Tanya Bcirch, Christine Beveridge, Bandana Biswas, Phil Brewer, Pick Kuen Chan, Kerry Condon, Liz Dun, Brett Ferguson, Peter Gresshoff, Jim Hanan, Attila Kereszt, Mark Kinkema, Yu-Hsiang Lin, Artem Men, Miki Miyagi, Sara Schaarshmidt, and Paul Scott for their help in presenting talks, running workshops, conducting tours, and showcasing their work.



Kate & Sophia counting nodules



Louise & Colleen staining mycorrhiza in *Lotus japonicus*

## Annual Soybean Harvest



Special thanks to all staff and students who gave their time to de-pod hundreds and thousands of soybeans. The process, involving hand picking, de-podding and sorting, is necessary in order to ensure enough soybean seeds are available for all nodes who require them for research purposes. Varieties grown this year include Bragg, *nod139*, *nts382* and Williams. Seeds are also supplied to teachers who participated in STEP IN LABS, as part of a Seeds for Schools initiative, to bring CILR research into the classroom.

## Change is in the air...

2007 sees Phase one of the CILR is coming to a close. However Phase two is set to be even bigger and better. Knowledge of meristem control and inter-meristem signalling gleaned during Phase 1 will be applied to new research work themes for Phase two. These work themes include roots in restrictive soils, modified shoot number and resource allocation, expanded symbiosis, floral, embryo and seed development control, and bioactive molecules bridging plant and animal systems. Results from these work themes have the potential to improve nitrogen and phosphorus use efficiency, improve canopy and carbon assimilation, increase beneficial plant-microbe interactions, produce hybrid crop plants and improve human and animal health products. In addition to these work themes and outcomes, the CILR is rapidly expanding its Pongamia Biotechnology Biodiesel Project (PBBP). Throughout 2007 *Pongamia pinnata*, a leguminous tree (see right), has been the subject of a 6-month pilot project funded by Pacific Renewable Energy (PRE).



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For Warlpiri people the act of being on country, using it, observing it, burning it and learning about it, is seen as an act of management. Such a view can be contrasted with our Western land management practices, which often assume that the healthiest landscape is one that is empty of people. It is quite the opposite for Warlpiri and a common phrase that is heard when people have not visited country for some time is *Yapa Walanagu*, meaning 'no (Aboriginal) people' and expressing sorrow at the fact that the country that is empty of people and therefore sick. Related to this is the essential notion of reciprocity between humans and environment. Warlpiri people (as with many Aboriginal groups) maintain that when people look after country, country looks after people. Healthy country means healthy people. This is both an obligation and an expectation. The returns may be physical, such as hunting and eating healthy food, but it is also expected that knowing the country leads to people being emotionally strong, having strong values and high self esteem.

Such a process was evident on a small scale after our country visit. As a result of learning about country, the young men were filled with pride, and returned to the community to tell others about the visit. To accommodate some other boys who also wanted to learn the elders ran a 'night school' in the community where the boys came to learn their traditional songs.

Most see this as a beginning point. By learning about country, its plants, animals, and stories, young Warlpiri people develop a sense of self esteem. One Warlpiri man promotes the message that "it is ok to be Warlpiri and from this position of strength it is then possible to engage with confidence with the wider Western world."

The country visits conducted as part of this CILR research are a small piece of this traditional Law. Discussions are currently being held with some of the Aboriginal organisations in the central desert to formalise the country visit process into an ongoing funded project that will preserve Indigenous Ecological Knowledge and support cultural values.