



PHYTOGEN

A
NEWSLETTER
FOR
AUSTRALIAN
PLANT SCIENTISTS

Volume 11 Number 1
March 2009

PHYTOGEN

Volume 11: Number 1

In This Issue

President's Report 2008

ASPS Office Bearers - 2009

A message from the new president

A message from the new editor

Our Society - An Historical Perspective

Jubilee Anniversary -- ASPS 50 Years

Recollections from Martin Canny

The Inaugural Members

Two New Life Members - Joe Wiskich and Barry Osmond

Highlights of ComBio2008

ComBio2009 and other Conferences

From Our New PhDs - Caitlin Byrt and Emily Grace

**From Our Seed Banks - a report on the 2008 Symposium of the
APGC Series "Air Pollution and Global Change"**

Functional Plant Biology

Plants in Action - a report on progress

Were you aware that? - Information about ASPS activities

Thanks to all who have contributed to this issue of Phytogen.

President's Report 2008

General

This year saw the retirement of Peter Ryan as treasurer and his replacement by Tony Ashton. Under Tony's guidance, the web site for the Society was revamped completely and on-line membership applications were processed for the first time and lapsed members tracked. With time this approach should gain us greater membership.

This year marks the 50th anniversary of the Society and this will be celebrated in a special dinner during ComBio, to be held at the CSIRO Discovery Centre. I would like to thank, Tony Ashton, Paul Kriedemann and Martin Canny for organising this dinner and for inviting several of the original members to attend. ASPS has been represented by Barry Pogson on the organising committee for ComBio2008 and under his guidance a strong plant presence has been assured.

Function Plant Biology

This year also saw a new regime in the management of our allied journal, *Functional Plant Biology*. CSIRO publishing decided to move to a Editor-in-Chief model of management with a reduced role for the then current editor Jennifer Henry. The FBP board met earlier in the year with CSIRO Publishing management to discuss the changed arrangements and a plan to phase in the editor-in-chief was suggested. However, the sudden resignation of Jennifer to take up a lucrative editorial position with *Nature* in New York brought the new model forward quickly. The plant community is very fortunate that Rana Munns, the President Elect of ASPS, agreed to take on the role of Editor-in-Chief.

Links with ASPB

Plans for the 2009 meeting in NZ are already under way and a strong plant physiology theme is planned there also. The American Society for Plant Biology will hold its annual meeting in Hawaii next year and their executive has been in touch to include ASPS as a "participating organisation". I will remain the ASPS contact for this meeting and hope to have some say in the conference's program.

I also received the following email message from ASPB

"We are writing to you in your capacity as President of the Australia Society of Plant Scientists, which we are very pleased to learn will be a "participating society" at Plant Biology 2009 in Hawaii. This message, however, is about something rather different.

With the growing number of critical global issues that impact the way we execute, plan and develop our scientific and practical goals within the plant sciences, our professional societies have many new issues and potential problems that are both global in nature and common to us all. As we reflected on the responsibilities of the American Society of Plant Biologists (ASPB) to further the professional and scientific advancement of our members and to inform the public and the government as to the value of plant biology in the struggle to cope with a growing food and fuel crisis, it became evident that we could not simply consider a North American perspective. Rather, a more global view of how plant biologists should deal with the central role that we will obviously play in the coming years could best position our profession for the challenges ahead.

ASPB is considering convening a "summit" of the worldwide leadership of professional societies that relate to plant biology and agriculture to explore common strategies and goals to bring our unique and critical expertise and perspective to those whose actions and policies will impact the globe over the coming years. This initial summit would be meant to explore ways in which our societies can work together to bring a global consensus of how plant biologists are responding and could respond to the needs of the global population. We are sending this email to ask if you might be interested in attending such a meeting, were it to be organized as one-day workshop to be held prior to ASPB's July 2009 annual meeting in Honolulu, Hawaii. We would also most welcome your thoughts as to the validity and usefulness of such a "summit".

I have responded positively to this suggestion and will make sure that the Executive is kept informed of developments. Any feedback would be appreciated.

Award winners 2008

The Robertson Lecture this year will be given by Professor Hans Lambers from UWA. The Goldacre medal will be awarded to Dr Jason Able from Adelaide University and the best paper award from FPB will go to Abby Cuttriss, currently City University, New York, USA. However, once again, we were unable to attract applicants for the Teaching Award and we need to rethink our strategy for this award.

We will also honour two additional long-serving members of ASPS with Life Membership, as agreed at the last Council meeting: Barry Osmond and Joe Wiskich. Both Barry and Joe will be at the dinner to receive their certificates.

Finally, I would like to thank the executive for their support and enthusiasm throughout the year and to the council members for their support of various initiatives. I wish to particularly thank Tony Ashton for his work not only with the finances but also with the new web site and on-line enrolment, and the secretary, Robyn Overall for organising the executive. I thank the outgoing council members for their work for the Society and members of the supporting subcommittees Marilyn Ball (Public Officer), Graham Farquhar (FASTS representative), Brian Atwell (Plants in Action); and last but not least the Phytogen Editor Helen Irving.

David Day
President, ASPS

APSP OFFICE BEARERS - 2009

ASPS Executive

President	Rana Munns	CSIRO Plant Industry
Past President	David Day	University of Sydney
Honorary Secretary	John Evans	Australian National University
Honorary Treasurer	Tony Ashton	CSIRO Plant Industry
Public Officer	Marilyn Ball	Australian National University

ASPS Council

Genetics & Molecular Biology	Penny Smith	University of Sydney
Cell Biology	Sergey Shabala	University of Tasmania
Plant Microbe Interactions	Peter S Solomon	Murdoch University
Plant Development	Anne Rae	CSIRO Plant Industry
Plant Science Education	Ros Gleadow	Monash University
Whole Plants	Michael Tausz	University of Melbourne, Creswick
Environment & Ecophysiology :		
Global Change	Oula Ghannoum	University of Western Sydney
Student Representative	Crystal Sweetman	Flinders University
FASTS Representative	Barry Pogson	Australian National University
FPB representative	Rana Munns	CSIRO Plant Industry
Plants in Action	Brian Atwell	Macquarie University

ASPS Sustaining Members

Beckman Coulter	www.beckmancoulter.com
Corbett Research	www.corbettresearch.com
Functional Plant Biology, CSIRO	www.publish.csiro.au
GeneSearch	www.genesearch.com.au
Promega Corporation	www.promega.com.au
Qiagen Pty Ltd	www.qiagen.com
Sapphire Bioscience	www.sapphirebioscience.com

ASPS Newsletter Editor

tina.offler@newcastle.edu.au

Tina Offler

The University of Newcastle

A message from the new president

Australian plant science continues to have a very high profile in the international community of scientists, particularly considering its small size (and minimal funding). This was demonstrated to me most recently at the Gordon Conference on salt and water stress in Montana USA, where about 20 out of the 120 participants were Australian.

Our national meetings also are of international standard, as exemplified by the annual ComBio conferences. We are part of the regular route of venues for continuing international meetings of Plant Molecular Biology, Plant Membrane Biology etc. This year we will be participating in ASPB at Hawaii, and organising a joint ComBio with the NZ Society of Plant Biology and other societies in Christchurch in December. This will be a time to develop closer continuing connections with the NZ Society.

ComBio conferences have been of limited interest to some of our ASPS members, so these special interests are being covered by satellite meetings. However, students and early career scientists should not be restricted to the satellite meetings, as they benefit from exposure to the broader issues covered by ComBio, and the chance to meet international speakers.

The society's close connections with Functional Plant Biology were consolidated this year when I took up the new position of Editor-in-Chief, on behalf of the society. My aim is for FPB to become a high class journal, publishing 1-2 topical reviews per issue with 8-9 very significant research articles. Taking advantage of the present A+ ERA ranking, we can soon show that a journal published in Australia can rank with the best of those published in other countries. Ten years ago, the journal under the former name of Australian Journal of Plant Physiology had an impact factor far exceeding most other plant biology journals, and an international reputation for the best papers in the areas of environmental biology and interdisciplinary studies. We should regain this status. The journal continues to support the society in funding the prestigious Goldacre Award, and the Best Paper Award for young scientists.

Despite the struggle for funding, the opportunities are plentiful for good science to continue in Australia, and for ASPS to have a role in supporting this.

I wish you all a successful 2009.

Rana Munns
President, ASPS

A message from the new editor

Dear Fellow ASPS Members,

I have been a bit slow at getting my head around the editorship of Phytogen, a circumstance for which I apologise. As the new editor my first task is to thank Helen Irving very sincerely for being Phytogen editor since 2004. Through that time she has continued to provide us with up to date information about the activities of our society and our science. I trust that I will be able to do the same.

In this issue you will find a mix of familiar and new sections. As one of the older members of the society the Jubilee Anniversary has sparked in me a greater appreciation of those who founded our society and who have made significant contributions to the advancement of Plant Science both nationally and internationally. Much of the society's recorded history is in the hands of a few. It seems timely to present some of this history and the contributions of members in Phytogen for reflection and posterity. To this end I have included a section on the history of our society that will be ongoing through a number of issues. I hope you find it interesting.

While the past is one thing, the ongoing advancement of knowledge of Plant Science is another. It rests with our newest members. For some time there has been an opportunity for those who have just been awarded their PhDs to share their research with us through articles in Phytogen. So, in this issue we have two contributions in "Our New PhDs" section and I look forward to this being an ongoing section in Phytogen. Please contribute if you are eligible.

In this issue we have a comprehensive report by Michael Tausz on "Plant Functioning in a Changing Global Environment" the 2008 Symposium of the APGC Series "Air Pollution and Global Change" in the "From our Seed Banks" section. Please remember that reports from local, national and international meetings and book reviews relevant to plant science are welcomed for the "From our Seed Banks" section and keep sending them to me at tina.offler@newcastle.edu.au

Next issue will see the continuation of the fascinating section on "State of Affairs" with **South Australia** in the limelight. I heard one member say that this section allowed her to find out what was happening not only in her state but in her organization!! I am also intending to approach discipline representatives for articles highlighting the significant advances in their fields.

Tina Offler

OUR SOCIETY AN HISTORICAL PERSPECTIVE

Jubilee Anniversary

Australian Society of Plant Scientists 50 years

The Australian Society of Plant Physiologists was formed 50 years ago and the first Conference, held in August 1958 in Adelaide was attended by most of the Inaugural members.

This significant anniversary was celebrated at the Annual ASPS Dinner held in conjunction with ComBio2008 on Tuesday September 23 at CSIRO Black Mountain, Canberra.

Original ASPP (Australian Society of Plant Physiologists) members were invited to attend and at least 13 were present at the dinner. During the Dinner celebrations there was a presentation by Martin Canny and a slide show loop of photos of early members provided by them and organised by Paul Kriedemann and Martin Canny. Paul and Martin have asked me to express their sincere thanks to all those who provided information and photographs to make this presentation possible and in turn I thank them for their efforts and for allowing me access to these materials for Phytogen.

At the dinner the names of inaugural members were displayed on sheets and Dinner participants who have had a scientific relationship with these members, or their Scientific Descendents, were encouraged to write their names on the appropriate members sheet. These “family trees” created much interest and hilarity with many people discovering scientifically-based interrelationships of which they were unaware. These “family trees” will appear in a subsequent issue of Phytogen along with an account of the early history of the society written by Tom Neales and photos taken at the dinner. During the dinner David Day presented “Life Memberships” to Joe Wiskich, an inaugural member of the society, and to Barry Osmond.

Recollections from Martin Canny - a 1958 Inaugural Member

About the Author:

Professor of Botany, Monash University 1965-86

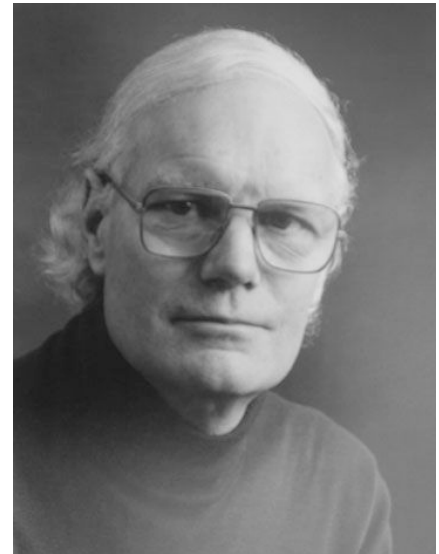
Worked on Phloem Translocation, and succeeded in producing high-resolution autoradiographs of radioactive sugars in cells.
Proposed a new theory of translocation

Honorary Research Professor, Carleton University, Canada 1986-99

Working with Margaret McCully on roots. Applied the freeze-substitution (as used for sugars) to follow fluorescent tracers in tracking water movement.
1995 Proposed a new theory for the ascent of sap.
1997 Discovered refilling of embolized vessels during transpiration.

Visiting Fellow, RSBS, ANU 2000 -

Working with Marilyn Ball on frost-freezing.
Exploring the consequences of his theory of the ascent of sap.



2006



‘Recollections’

Hal Hatch said to me, "Tell them how different it was, how difficult to get from Sydney to Adelaide." He had taken two days in trains, overnight from Sydney to Melbourne, with a midnight change at Albury to accommodate a shift in rail gauge from 4 feet 8 1/2 inches (New South Wales) to the Victorian line gauge of 5 feet 3 inches, then another overnight trip to Adelaide, with yet another change in railway gauge down to 3 feet 6 inches for South Australia.

I remember that western Victorian line. The train stopping at some minor station where I read the sign: "Passengers wishing to join trains should exhibit the red flag during the hours of daylight, and light the red lantern during the hours of darkness."

Another train story told me by Professor Des Herbert (Queensland) at that Adelaide meeting: how he was travelling on a Queensland train that stopped frequently and for extended periods. Des took these

opportunities to explore the countryside and collect plants. The guard, furious at what he regarded as criticism of his train, admonished him. "Young man, if you do that again I will take the view that you have broken your journey, and charge you another fare!"

Hal, incidentally, was coming from the CSIRO Plant Physiology Unit at Sydney Botany Department, where Bob Robertson had the most diverse and active group of plant physiologists in the country, and it was he who had been pressing like-minded botanists around Australia to found the Society that was to become ASPP.

He arranged with Professor Joe Wood of Adelaide Botany Department that the inauguration of ASPP should be at the ANZAAS meeting scheduled for Adelaide. Bob Robertson's group comprised a dozen or so young physiologists who were to make major advances in our science, including Hal Hatch, Alex Hope, John Pate, Carrick Chambers, Don and Heather Adamson, John (F) and Donella Turner. Jack Dainty had come there from Edinburgh to work with Alex Hope. Of the 69 founding members, 14 came from the Plant Physiology Unit (and see pp.13).

The main preoccupations of plant physiologists during those days included:

1. Energetics and ion relations

How was the energy supply of respiration applied as work to accumulate ions against a concentration gradient? This work was based especially at Sydney PPU. Bob Robertson had done his PhD on this topic at Cambridge with GE Briggs, and had discovered the stoichiometry of salt respiration viz. 4 electrons per O atom. The group comprising Alex Hope, Jack Dainty, Enid MacRobbie, Alan Walker, and expanded to include Mike Pitman, Andrew Smith, Joe Wiskich, worked hard, but did not find the answer. They were nevertheless poised to understand and interpret the answer put forward by Peter Mitchell in Cambridge, of his Chemiosmotic Hypothesis. Bob saw the significance of this hypothesis, and interpreted it for the rest of us: that it was the protons, not electrons that were important, and how the gradient of proton concentration across a membrane was used to turn ADP into ATP, and how this generation of ATP could apply to energy generated during both respiration in mitochondria, and light energy transduction in photosynthesis. These discoveries caused Bob to switch his research into the structure and behaviour of membranes, where again he stimulated the thought and work of a new generation of physiologists.

2. Mineral nutrition

Nutritional deficiencies in Australian soils were found to limit the growth of native vegetation and more especially, crops. This was especially the preoccupation of Joe Wood and his group at Adelaide, including Ray Specht who was then at the Waite Institute. It goes back further to Sir Charles Martin (who was my Godfather and to whom I owe my name). When Charles Martin retired as Director of the Lister Institute in London, he came to Adelaide in 1931 for a short spell as Professor of Physiology. There he had major influences on the development of Australian science. He got the young Macfarlane Burnet interested in viruses, he showed the Australian government how they could safely get rid of rabbits with myxomatosis, he showed Australian farmers how they could rid the sheep of blowflies by what is now called "mulesing", and, as a lifetime

nutritionist himself, he inspired work on trace elements. He contrasted the state of South African sheep kept healthy with bonemeal licks with Australian sheep which did not respond to this, but required superphosphate licks instead. He reasoned that there must be something else in superphosphate that was lacking in Australian soils. This inspired the work of Joe Wood and colleagues Ray Specht and Hedley Marston to find the benefits of traces of Cu, Zn, Co, and Hedley Marston devised the slow release, Co-containing ceramic balls that were put into sheeps' stomachs. This line of work expanded under founding member David Riceman to make productive the land of the Ninety Mile Desert, and continued with John Pate in WA studying P and N accumulation in native species and crops.

3. Photosynthetic carbon metabolism

Plant Biochemistry (formerly a poor relation of animal biochemistry) had become exciting with Calvin's demonstration in the early 1950's of the carbon cycle of photosynthesis. The Turners at Sydney University, Bob Morton at Adelaide and Les Paleg at the Waite Institute were expanding enzyme studies in several areas of plant metabolism. This area of research was greatly encouraged when the young Hal Hatch in Brisbane discovered C_4 photosynthesis, inspiring world-wide the explorations of photorespiration and CAM metabolism.

4. Plant hormones and herbicides

Another emerging preoccupation in those days was the action of plant growth substances, and their analogues that could kill weeds. This area of research was inspired by Wayne's conspicuous success surrounding applications of 2,4-D and its analogues, and where the chemical industry was investing heavily in a search for other systemic weedkillers. I did not know Wayne at that time, but I knew him later, and once remarked that I hope he had got a fair share of the profits for his discoveries. He said yes, that he had a large and growing collection of gold! That was the stream of physiology that I had joined, employed by ICIANZ to find a killer for bracken. Coincidentally, Nick Marinos at Waite Institute was looking for some way of killing Oxalis. The systemic nature of these substances, travelling as they did in phloem, led many of us into the general field of vascular translocation. Herbicide physiology was perhaps the least productive of the research streams within plant science during those times. It became even less respectable with the publication of Rachel Carson's book 'Silent Spring' in 1960, and positively notorious after revelations about Agent Orange. I recall a Japanese paper at a conference in 1960 that summed up these dilemmas. "Last year we kill one hundred farmers, but we grow one million tons more rice. What we call 'Operation Silent Spring'". Oxalis continues a pest in everybody's garden, and though someone told me they had found a killer for bracken, I recall that John Pate, a founding member of ASPP, bought a property in southern WA which was covered in bracken, and which he dug out by hand! John is the only person I have ever known who had the strength and persistence to achieve this.

5. Vascular translocation

Returning to other questions of the 1950s, how phloem moves sugar and how sap gets up trees, are still disputed. For those of you who think they know how sap gets up trees, I set you a small physiological puzzle.

In 1727 Stephen Hales cut a branch from an apple tree and sealed the cut end in a tube with beeswax and turpentine. He filled the tube with water and stood it in a bucket of layered water over mercury. The mercury rose up the tube many inches. Just what you expect. But in another chapter of 'Vegetable Staticks' he took a different apple branch and tube, left the tube filled with air, and stood the bottom of the tube in a bucket of water. Again the water rose up the tube, displacing the air. Explain that. You may say it did not happen, you don't believe it. But Strasburger repeated the experiment in the 1890s many times and showed that the water could rise right up to the cut end, and the branch resumed transpiring water. I have verified the observation myself.

I end on a serious note. Putting together this presentation has been both a pleasure in remembering happy times, and a sadness in realizing how many of the founders are not here tonight. Housman's words have continually recurred to me:

With rue my heart is laden
For golden friends I had
For many a rose-lipp'd maiden
And many a lightfoot lad

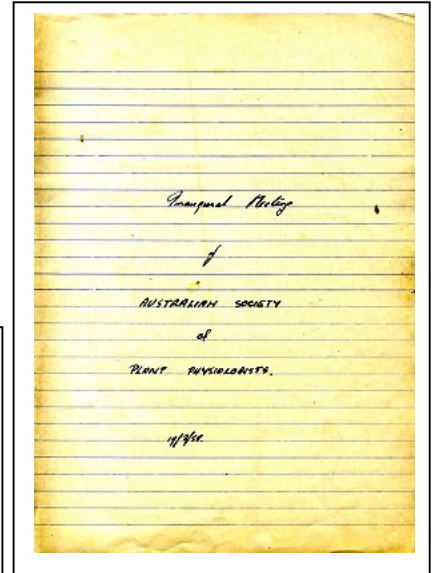
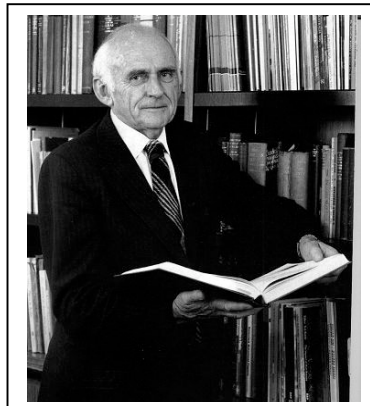
By brooks too broad for leaping
The lightfoot boys are laid
The rose-lipp'd girls are sleeping
In fields where roses fade

Martin Canny
ANU Canberra October 2008

The Founding Meeting and Inaugural Members

The Society was founded on 19 August 1958 during a meeting of the Australian and New Zealand Association for the Advancement of Science (ANZAAS) in Adelaide, on the initiative of Bob Robertson at the CSIRO/Botany School Unit in Sydney. He had been gathering support for the independent Society during the previous year.

The CSIRO/Botany School Unit, headed by Bob Robertson, and housed in the Sydney Botany Department was the core from which ASPP grew and expanded. Bob brought many of its members to Adelaide for the Founding Meeting, and many of them went on to distinguished careers in plant physiology in Australia and abroad. The original record of attendees at the meeting is presented below. Many of the names on these fading sheets of paper are of those you will recognise for their significant contributions to Australian Plant Science and to our society.



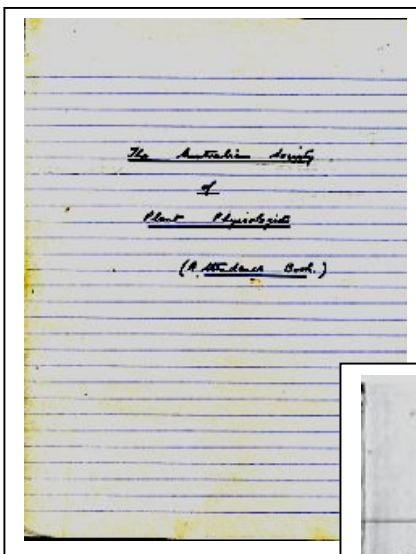
Bob Robertson



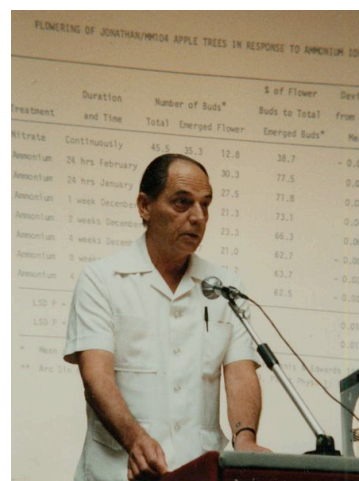
Members of the CSIRO's Plant Physiology Unit, and some from its parent Division, circa 1954.

1. Shigeru Honda, 2. Jeanette Gregory, 3. Eric Hall, 4. Joan Bain, 5. Marjory Wilkins (birthday), under 6. Bob Withers, 7. John Turner, 8. Lydia Nestel, 9. Jan Mercer, 10. Frank Mercer, 11. Barbara Johnson, 12. Des McLean, 13. Peggy Clark, 14. Spin Turner, 15. ABH, 16. Bob Robertson, 17. Frank Huelin.

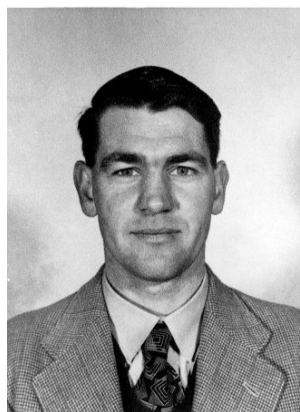
The Inaugural Members



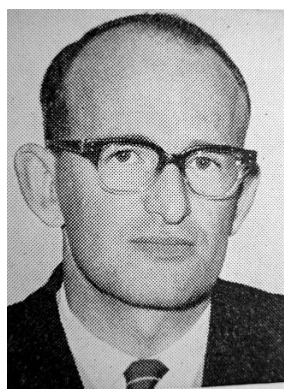
Hal Hatch



Gordon Edwards



Peter Goldacre



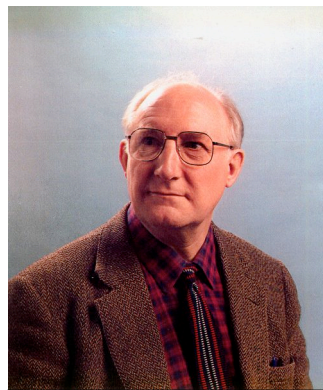
Barry McGlasson

Name	Address
Shubille	Nat. Institute 7 B Adelaide
R. K. Morton	Dept of Ag. Chemistry, Waite Institute, Adelaide
L. A. Thomas	CSIRO, APPLETHORPE, SAID
Mr. P. Hignatz	CSIRO Div of Plant Industry Brisbane
N. K. Bondina	CSIRO, P.O. Box 109 Canberra
M. D. Hatch	CSIRO, Botany Dept University of Sydney
J. J. Wickett	Botany Dept. University of Sydney
P. L. Gelfand	CSIRO, Div. of Plant Industry, Canberra
P. R. Whitfield	CSIRO Div. of Plant Industry, Canberra
G. A. ATKINS	Defence Standards Laboratories, Dept of Supp. Melbourne
D. M. PATON	Bot. Dept. University of TAS.
F. J. F. Fisher	Botany Department, University of Tasmania
H. Minnie	Botany Dept University of Western Australia
N. G. SLATER	CSIRO Division of Plant Industry, Canberra
J. Pales	Waite Inst. Adelaide
A. P. Kefford	C.S.I.R.O., Division of Plant Industry, Canberra
A. G. Morris	Waite Inst. Adelaide
G. R. Edwards	Dept Plant Physiology Waite Inst. Adelaide
D. Aspinall	Waite Inst. Adelaide
B. A. Kirk	Waite Inst. Adelaide
M. B. Spurling	Dept Agric South Australia.
M. G. Glass	" " " "
J. B. Jones	CSIRO Div Biochem & Food Nutrition Adelaide
D. S. Newman	" " " "
I. F. Coates	Botany Dept, Melbourne University.
J. L. Fisher	Botany Dept, University of Adelaide.

The Inaugural Members



Alan Walker



Harold Woolhouse



John Pate



Denis Carr



Peter Brownell

19/8/51

Name	Address
R.J. Kirkland	Biochemists, Dept. Univ. of Sydney.
A. S. Grant Liff	C.S.I.R.O. Division of Plant Industry, Canberra.
John Falk	" " " " " "
J. Davis	Biophys. Dept. University of Edinburgh.
J. Phillips	C.S.I.R.O. Division of Plant Industry, Canberra.
A. Walker	C.S.I.R.O. Division of Plant Ind., Canberra.
G.K. Sutherland	CSR Co. Ltd. Research Dept., Sydney.
E.A. Appleby	C.S.I.R.O. Division of Plant Industry, Canberra.
John S. Pate	Botany School & C.S.I.R.O. Plant Physiology Unit, University of Sydney.
John S. Pate	Botany Dept. University of Adelaide.
M. Jackson	" " " " " "
A. B. Carrasco	Botany Dept. Univ. of Adelaide.
John L. Hawthorn	Botany Dept. Univ. of Adelaide.
Kevin Shortwood	Botany Department, University of Adelaide.
Harold Woolhouse	Botany Department, University of Adelaide.
R. L. Spiller	Botany Dept., University of Adelaide.
Z. H. Turner	C.S.I.R.O. Botany Dept. University of Sydney.
J.P. Sauerbort	C.S.I.R.O. Division of Food Preservation, Melbourne.
J. Bain	C.S.I.R.O. Division of Food Preservation, Melbourne, N.S.W.
H. GROENEWEGEN	C.S.I.R.O. Irrigation Research Station, Griffith, N.S.W.
P. Brownell	Botany Department, University of Adelaide.
A. W. Schilling	Botany School, University of Sydney.
D. Carr	Botany Department, University of Melbourne.
M. S. CANNY	ICI/ANZ Central Research Laboratory, Melbourne.
A. J. M'COMB	Botany Department, University of Melbourne.
D.F. GAFF	Botany School, University of Melbourne.
K.S. Rowan	C.S.I.R.O. Botany School, University of Melbourne.

The Inaugural Members



Lloyd Evans



Don Adamson



Alex Hone



JG (Joe) Wood

19/8/63

Name	Address
J.D. McLEAN	CSIRO DIVISION OF INDUSTRIAL CHEMISTRY BOX 4331 GPO MELBOURNE
A.B. HOPE ^M	PLANT PHYSIOLOGY UNIT, BOTANY SCHOOL, SYDNEY UNIVERSITY
T. CHAMBERS ^M	" " " " " " " "
D. ADAMSON ^M	" " " " " " " "
H. ADAMSON ^M	" " " " " " " "
C. T. LEE ^P	CSIRO, Griffith, NSW.
R.F. WILLIAMS ^P	C.S.I.R.O. Division of Plant Industry A.C.T.
J. G. WOOD ^P	Dept of Botany, University of Adelaide.
R.H. ROBERTSON ^P	Plant Physiology Unit, CSIRO & Botany School, University of Sydney
L.R. MAY ^P	Department of Plant Physiology, Waite Institute, Adelaide
63	
Also attended	
J.F. TURNER ^M	Plant Physiology Unit, C.S.I.R.O., Botany School Sydney
J.S. TURNER ^P	
L. EVANS ^P	
64 members attended	
17th May (Sat)	

Two New Life Members

Life Membership Certificates were presented to Joe Wiskich and Barry Osmond at the Jubilee Dinner by David Day, President of ASPS. Below are David's citations for Joe and Barry.

Professor Joe Wiskich

Professor Joe Wiskich graduated from the University of Sydney with a PhD in 1961, under the supervision of Bob Robertson, in ion transport and electron transport in mitochondria. Joe subsequently took up a postdoctoral fellowship with Walter Bonner Jnr at the Johnson Research Foundation in Pennsylvania; his first paper with Bonner later became an ISI citation classic. Joe then undertook a second postdoc at UCLA working with Jacob Biale and George Laties, before being lured back to Australia by Bob Robertson, taking up a lectureship in the Botany Department at the University of Adelaide. Joe served on many committees, including the Executive Council, of the university. He was a very active member of ASPP, helping to organise several meetings, and was elected president in 1996-97. Joe made a Fellow of the Australian Academy of Sciences in 1993 and held an ARC Special Investigator Award from 1993 – 95. He was awarded the Verco medal from the Royal Society in 1997 for his service to plant science.

Joe has had an illustrious career in plant biochemistry and physiology and has authored more than 200 publications. He has served on several editorial advisory boards and written several hallmark reviews. Joe's main areas of research were in mitochondrial and chloroplast electron transport and metabolism. Joe pioneered the isolation of intact and functional organelles from plants and provided seminal insights into the workings of both chloroplasts and mitochondria, especially in the transport of metabolites between the organelles and the plant cytosol, and the operation of alternative electron transport pathways. Joe was also a major advocate of the chemiosmotic hypothesis at a time when few people in the field accepted it and even fewer understood it. His lectures to undergraduates on this topic were classics. Joe has trained a large number of students and postdocs and has left a lasting legacy in plant science.

We are very pleased to award Joe life membership of the Society.

Professor Barry Osmond

Barry Osmond received his BSc (Hons) and MSc from the University of New England and a PhD from Adelaide in 1965. He became a Research Fellow; Australian National University 1967-69 and was made Professor of Environmental Biology in 1978. Barry was appointed Director, Research School of Biological Sciences 1991, a position in which he served until 1998, subsequently becoming the leader of the Photo Bioenergetics Group until 2001. During this time he also held the post of Executive Director, Biological Sciences Center, Desert Research Institute, University of Nevada and was Distinguished Professor of Arts and Sciences, Duke University, Durham, USA.

Barry has won a large number of impressive awards and prizes, including the Goldacre Medal, in 1972; and the Edgeworth David Medal, Royal Society of New South Wales in 1974. He was elected Fellow, Australian Academy of Science in 1978 and made a Fellow, Royal Society in 1984 and of Germany's oldest scientific academy, the Leopoldina in 2001. He has served on many editorial boards and panels and as Editor in Chief of *Functional Plant Biology*. Barry has been a very active member of the Society and was President of ASPP in 1994-96.

As a recent assessor of a grant application remarked: "Barry Osmond is one of the prime reasons Australia has such a high reputation in plant science. He is one of the most cited authors in photosynthesis research and continues to publish in high impact factor journals and to be extensively cited."

Barry's field of research, of course, is photosynthesis and photorespiration, where he has made seminal contributions over many years. To select just one facet, his research on photoinhibition is legendary and he has left a lasting legacy in the field. Barry has been a true leader in plant science in Australia and internationally and it is a pleasure and honour to award him a life membership of the Society.

Messages from our Sustaining Members


CEQ™ 8800 GENETIC ANALYSIS SYSTEM

WITH NEW VISUALISATION SOFTWARE

The newest member of our CEQ family utilizes over a decade of innovation in automation and CE technology to provide an advanced, high-resolution multi-purpose system that adapts nimbly to daily changes in sample type and complexity. No matter what your target may be.

- Powerful set of tools for manipulating, organising and analysing genetic information including genotypes, phenotypes and pedigrees
- Dual 96-well plates for walk-away operation
- Accurate sample tracking and reporting
- One gel—One array—One software, for all applications
- Wide range of genetic applications for sequencing and fragment analysis

© 2009 Beckman Coulter, Inc. ALLP is a registered trademark of Stratagene/Agilent.



For more information contact:

Ph: 1800 060 800
Fax: 1800 060 879
Email: lifescienceaustralia@beckman.com
Website: www.beckmancoulter.com

BECKMAN COULTER
 Simplify • Automate • Innovate

PCR in Less than 10 minutes? Yes!

Achieve Unmatched Performance with the New Piko Thermocyclers from Finnzymes

The combination of the high performance Piko design with Slidetiter™ ultra thin-walled tubes and high-processivity Phusion® DNA Polymerase achieves unmatched cycle times, allowing PCR programs to be completed in less than 10 minutes for PCR fragments up to 400 nucleotides long.

Piko thermocyclers are available in 24 and 96 well formats, with 384-well coming soon. The innovative Slidetiter™ format allows all three capacities to fit in an area a quarter the size of a standard microtitre plate, while retaining compatibility with robotic systems. The result is a thermocycler with an extremely small footprint (16.5 x 17.5 cm).

- * Half the size of the smallest thermal cyclers, half the price of high performance thermal cyclers and 4x lower power consumption than conventional thermal cyclers
- * Automatic pressure setting motorized heated lid
- * CD drive-like loading of plates and tubes
- * Easy to use interface
- * Exceptional ramping speed, thermal uniformity & stability and settling time
- * Licensed for PCR



Genesearch

www.genesearch.com.au info@genesearch.com.au 1800 074 278



ComBio2008, 21-25 September 2008

ComBio2008 was another successful ComBio meeting with good representation from Plant Scientists. A number of excellent plenary lectures and the two plant science streams, the latter often supplemented by plant topics in other symposia, gave amply choice and often too much. Some highlights:

- **Jason Able** presenting the 2008 Peter Goldacre Lecture on our understanding of meiosis in bread wheat: 50 years young.
- **Hans Lambers** presenting the RN Robertson Lecture on phosphorus nutrition of Proteaceae and Cyperaceae strategies in biodiversity hotspots in old landscapes with particular emphasis on the southwest of Western Australia.
- **Manuela Chaves** presenting the Annals of Botany lecture on physiological and molecular regulation of grapevine and berry development under deficit irrigation.
- A wealth of stimulating Plenary Lectures including **Sarah Assmann** presenting on cell-specific gene expression patterns as tool to identify candidate genes for plant hormone responses and human disease; **Robert Last** presenting the latest functional genomic approaches being used to unravel secondary metabolism in tomato trichomes; **Dean DellaPenna** illustrating how integration of the various “omics-technologies” is allowing work at the interface of plant biochemistry, genetics, genomics, human nutrition and agriculture to potentially address long standing nutritional problems on a global scale; **Stephen Long** addressing the question of achieving sustainable second-generation biofuels from plants; **Leon Kochian** discussing recent advances on the molecular basis of crop aluminum tolerance using sorghum as a model system and **Scott Poethig** presenting a genetic analysis of vegetative phase change in *Arabidopsis* and maize by miRNAs under the title “Turning over a new leaf”.
- Excellent poster sessions and trade exhibits.

2008 AWARDS

ASBMB Invitrogen Education Award:

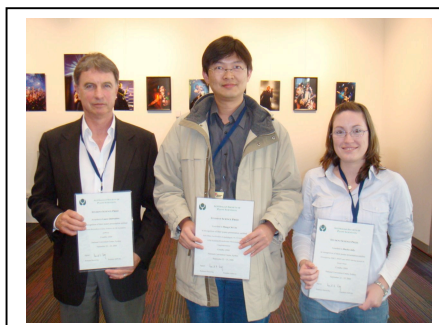
Congratulations to **Dr Susan Howitt** (Australian National University, ACT) on receiving this prestigious award.

ASPS Poster Prizes:

Congratulations to **Hayley Jolly** (University of Adelaide, SA), **Hung-Chi Liu** (University of Western Australia, WA) and **Laura Quittenden** (University of Tasmania, TAS) winners of 2008 poster prizes from a very competitive field. The abstracts for these posters are presented below:



Dr Susan Howitt
receiving the ASBMB
Invitrogen Education
Award from Joanne
Broughton



ASPS President
Professor David
Day with ASPS
prizewinners
present at
awards
ceremony
(from left):
Hung-Chi Liu
and Hayley Jolly

INVESTIGATING DMC1, HOP2 AND MND1 DURING MEIOSIS IN BREAD WHEAT

Jolly H.R.¹, Milligan A.S.² and Able J.A.¹ ¹Molecular Plant Breeding CRC, School of Agriculture, Food & Wine, The University of Adelaide, SA, 5064. ²Australian Centre for Plant Functional Genomics, School of Agriculture, Food & Wine, The University of Adelaide, SA, 5064.

During meiosis homologous chromosomes align and pair through the processes of recombination and synapsis. In diploid species such as *Saccharomyces cerevisiae*, mouse and humans the HOP2:MND1 (H2M1) protein complex has been observed to have a positive catalytic effect on the sequence specific strand invasion and pairing abilities of the recombination protein DMC1. Isolation and characterisation of the bread wheat orthologues of *DMC1*, *HOP2* and *MND1* revealed high levels of similarity across several eukaryote species at the DNA sequence and amino acid levels. Furthermore, at the structural level, DMC1 has high levels of conservation between the mouse, human, rice and wheat proteins. However, comparable to previously studied plants, but in contrast to other higher eukaryotes, the expression of these genes is not meiosis-specific. The wheat *DMC1* gene is regulated during meiosis, with a four-fold increase in expression observed at the onset of meiosis relative to the later stages and vegetative tissues. Future work will investigate the spatial and temporal localisation of the proteins, revealing greater detail about the role each of these candidates has during meiosis in bread wheat.

SUBCELLULAR LOCALIZATION OF *ARABIDOPSIS* 14-3-3 ISOFORMS USING *IN PLANTA* BIMOLECULAR FLUORESCENCE COMPLEMENTATION

Liu H.C.¹, Ludwig M.¹ and Martin T.² ¹School of Biomedical, Biomolecular & Chemical Sciences, University of Western Australia, Crawley, WA 6009, Australia. ²School of Biomedical, Biomolecular & Chemical Sciences and School of Plant Biology, University of Western Australia, Crawley, WA 6009, Australia.

The highly conserved 14-3-3 proteins, which compose a eukaryotic family and act as key regulators of a wide range of biological processes, such as metabolic enzyme regulation, cell cycle control, ion transport, gene expression, protein assembly and translocation. Such regulation is achieved by interaction of 14-3-3 homo- and heterodimers with partner proteins. To date, more than 100 binding partners of 14-3-3s have been identified, mainly through far-Western analysis, immunoprecipitation, yeast two-hybrid screening or *in silico* predictions. Recently, Bimolecular Fluorescence Complementation (BiFC) enabled the visualization of protein: protein interaction *in planta*. The technique is based on the interaction of two candidate proteins translationally fused to non-fluorescent fragments of the yellow fluorescent protein (YFP). Such interaction leads to functional YFP reconstitution and fluorescence. Using BiFC dimerisation studies of *Arabidopsis* 14-3-3s in transiently transformed *Nicotiana benthamiana* epidermal cells we were able to show homo- and heterodimer specific distribution between the nucleus and the cytoplasm. Most of the 14-3-3 homodimers (χ , ϵ , ι , κ , μ , ω , \omicron , ϕ and ψ) were localised in the cytoplasm and nucleus. In contrast, homodimers of 14-3-3 ν were excluded from the nucleus but could be found in the cytoplasm and in the surroundings of the nucleus, possibly in or attached to the nuclear envelope. Heterodimerisation with κ , ω or \omicron lead to nuclear localisation of 14-3-3 ν whilst ν heterodimers with ϕ or ψ remained excluded from the nucleus. These results clearly revealed that 14-3-3 dimers have preferential intracellular distribution.

AUXIN BIOSYNTHESIS IN PEA: EVIDENCE FOR THE TRYPTAMINE PATHWAY

Quittenden L.J.¹, Davies N.W.², Smith J.A.³, Molesworth P.P.³ and Ross J.J.¹ ¹School of Plant Science, University of Tasmania. ²Central Science Laboratory, University of Tasmania. ³School of Chemistry, University of Tasmania.

One pathway leading to the bioactive auxin, indole-3-acetic acid (IAA), is known as the tryptamine pathway, which is suggested to proceed in the sequence: tryptophan (Trp) – tryptamine – N-hydroxytryptamine – indole-3-acetaldehyde (IAAld) – IAA. This pathway has been characterised mainly by the *YUCCA* genes in *Arabidopsis thaliana* and their homologs in other species. Here we complement the genetic findings with a compound-based approach in pea (*Pisum sativum*), detecting potential precursors by gas chromatography/tandem-mass spectrometry (GC/MS/MS). In addition, we have synthesised deuterated forms of the intermediates, and have used them to quantify the precursors, and to determine their metabolic fates. Trp, tryptamine, IAAld, indole-3-ethanol (IET) and IAA were detected as endogenous constituents, and their metabolism patterns indicate that the tryptamine pathway operates in pea roots.



COMBIO 2009

CHRISTCHURCH CONVENTION CENTRE
CHRISTCHURCH, NEW ZEALAND, 6–10 DECEMBER, 2009

Matthew Turnbull (NZSPB/ASPS) and David Palmer (NZSBMB) invite you to join us at ComBio2009 in Christchurch. We are planning a comprehensive and wide ranging scientific programme with plenty of the traditional ComBio features. We also hope that you will take the opportunity to use Christchurch as a gateway to the fantastic New Zealand landscape.



Protein Structure and Function	Cells and Development	Signal Transduction and Gene Regulation	Genetics and Genomics
Emily Parker/Juliet Gerrard (U Canterbury)	Phil Crosier (U Auckland), Ian McLennan (Otago U)	Pete Shephard (U Auckland)	Jack Heinemann (U Canterbury)
Bastian Kobe/Jenny Martin (U Queensland)	Peter Gunning (Westmead), Peter Koopman (U Queensland)	Phil Robinson (CMRI)/Christina Mitchell (Monash U)	Merlin Crossley (U Sydney)
			Christine Wells (Griffith U)
Plant Biology	Plant Ecophysiology and Global Change Biology	Microbiology	Agricultural and Horticultural Science
David Collings (U Canterbury)	Margaret Barbour (Landcare Research, NZ)	Andrew Hudson (ESR, NZ)	Jon Hickford (Lincoln U)
Steve Tyerman (U Adelaide)	Owen Atkin (ANU)	Hatch Stokes (Macquarie U)	Julian Heyes (Crop + Food Research, NZ)
			Phil Hogg (UNSW)

Invited International Speakers

Sir John Walker FRS	Nobel Prize in Chemistry 1997	Doug Eaton	Why we don't drown every day: a new paradigm for lung fluid balance	Yair Shachar-Hill	Title to be advised
Vern L. Schramm	Enzymatic transition states and inhibitor design	Misha Perouansky	Mechanisms of anesthetic action – why we know so much and understand so little	John Grace	The links between the nitrogen and carbon cycles under climate change
Janet L. Smith	Enzyme domains in assembly lines for antibiotic biosynthesis	Caroline McMillen	Fetal and postnatal programming of obesity and metabolic disease	Guillaume Tcherkez	Isotopic fractionation in plant metabolism
David Ornitz	Fibroblast growth factors in development and disease	Pankaj Sah	Generation of patterned neuronal activity in the brain	Aled Edwards	Genome-scale studies of the structure and function of protein families
Benjamin Geiger	Mechanisms underlying environmental sensing via focal adhesions	Tim Wiltshire	Title to be advised	Rudi Amman	Analyzing the microbial catalysis of biogeochemical cycles by combining quantitative diversity studies with (meta) genomics
Thomas A. Rando	Molecular regulation of muscle stem cell fate	Wan Lam	Title to be advised		
Peter Lobel	Title to be advised	Chris Hawes	Imaging secretory pathway dynamics in living cells		
Michael Karin	Title to be advised				

Registration information and on-line registration: www.conference.canterbury.ac.nz/combio09

Enquiries – Email: combio09@uco.canterbury.ac.nz, Phone: +64 3 364 2534

OTHER CONFERENCES

1st International Plant Phenomics Symposium : from Gene to Form and Function Canberra 21-24 April , 2009 Venue: Discovery centre, CSIRO Canberra, Australia

This three-day Symposium will bring together leading researchers from Australia, Europe and North America and will span screening techniques and analytic approaches for assessing biotic and abiotic stress, growth and yield and ecosystem dynamics and climate change. It will also provide an opportunity for researchers to explore ideas for future innovations and collaborations to address the global issues of food security, appropriate biofuel feedstocks and climate change adaptation.

Programme and speakers:

Biotic Stress: Julie Scholes, UK and Michelle Watt, Australia

Abiotic Stress: Bernard Genty, France , Peter Gregory, UK , Richard Richards, Australia , Bob Furbank, Australia , Mark Tester, Australia and Peter Langridge, Australia.

Growth and Yield: Achim Walter, Germany , Terenzio Zenone, Italy , Uli Schurr, Germany and Dave Kramer, USA.

Ecosystem Dynamics and Climate Change: Joe Berry, USA , Hamlyn Jones, UK , Michael Purugganan, USA, Marilyn Ball, Australia and Darius Culvenor, Australia

For more details and registration see APPF website: <http://www.plantphenomics.org.au/>

2nd International Network of Plant Abiotic Stress meeting: Plant Abiotic Stress – from signalling to development Tartu, Estonia, 14-17 May, 2009

**Plant Abiotic Stress -
from signaling to development**
14-17 May 2009 Tartu Estonia

**2nd International Network
of Plant Abiotic Stress*
meeting**
*INPAS is supported by EU COST action FA0605

Invited Speakers:
Nam-Hai Chua
Tamas Dalmay
John Doonan
Simon Gilroy
Maarten Koornneef
Matthieu Reymond
Montserrat Pages
Oscar Ruiz
Jian-Kang Zhu

Venue:
Dorpat Convention Centre
www.dorpat.ee

Organizers:
cost-inpas.org
www.ut.ee/plants

Secretariat:
inpas@frens.ee
www.ut.ee/inpas

www.ut.ee/inpas

Annual Meeting of the American Society of Plant Biologists in Honolulu, Hawaii, 18-22 July, 2009

Registration is open for Plant Biology 2009, the joint annual meeting of the American Society of Plant Biologists. The deadline for early-bird registration is April 24, 2009. ASPS is a partner organisation which means that members of our society qualify to register at member rates.

Major Symposia include Crop Functional Genomics, Evolution and Plant Biology, Photo morphogenesis and Plant Natural Products.

There is also a workshop following the main meeting on C3 to C4: A Workshop to Evaluate Strategies for Engineering C4 Photosynthesis into C3 Plants. Organizers: Rowan Sage, Tom Brutnell and Bob Furbank. July 23, 2008, Hilton Hotel, Honolulu Hawaii.

<http://www.aspb.org/pb-2009>

XVI International Plant Nutrition Colloquium **California 26-30 August, 2009**

Plant Nutrition for Sustainable Development and Global Health

The 16th International Plant Nutrition Colloquium will highlight advances in fundamental and applied plant nutrition, and emphasize the role of plant nutrition in food systems and environmental sustainability. The colloquium will attract the worlds leading researchers in plant nutrition, leaders in extension and policy design from government and private organizations and representatives of leading commercial enterprises.

Conference Venue

The IPNC will be held in Sacramento, located in California's Central Valley, one of the largest and most diverse centers of agricultural innovation and production in the world. The conference venue is close to many world-class attractions including the Tahoe basin, San Francisco, Napa Valley. The University of California campuses at Davis and Berkeley are located 10 and 100 kilometers, respectively, from the convention site and transportation will be arranged for delegates wishing to visit these sites.

Registration and call for papers now open. Program available at: www.ipnc.ucdavis.edu

Conference hosted by the Department of Plant Sciences and the University of California.

From Our New PhDs

Our recently completed PhDs who are the future of plant science and our society are encouraged to provide highlights of the research that earned them their new degree. Below are accounts by Dr Caitlin Byrt and Dr Emily Grace. I encourage others to send me their research highlights (see “Are you aware that ...?”, pp. 35)

Tina Offler

Salt teams joined forces delivering an exceptional study opportunity

Recently graduated University of Adelaide student, Caitlin Byrt, is grateful for the opportunity to work on a project fostered by the strong links between salinity research teams led by Dr Rana Munns at CSIRO Plant Industry and Professor Mark Tester at the Australian Centre for Plant Functional Genomics (ACPGF) and the University of Adelaide.



Dr Munns and Professor Tester suggested a project focussed on the mapping and characterisation of a gene for sodium exclusion in wheat, *Nax2*. Caitlin was able to work both in Canberra, at CSIRO Plant Industry within the High Performance Crops for Australia Group, and also at the ACPFG and the Plant Research Centre located at the Waite Campus of the University of Adelaide.

The project led to the identification of a sodium transporter gene, *Triticum monococcum HKT1;5-A*, as being a candidate gene for the sodium exclusion gene, *Nax2*, which confers a phenotype of low leaf Na^+ . Hence, *Nax2* limits the toxic accumulation of Na^+ in the leaves, which is a problem for wheat growing in saline soils.

Nax2 was mapped to the distal region on chromosome 5AL based on linkage to microsatellite markers. A *Triticum aestivum HKT1;5-D* gene was also found to co-locate with the major Na^+ exclusion locus in bread wheat, *Kna1*. It was found that *Nax2* and *Kna1* may be homeologous genes mapping to groups 4 and 5, respectively, due to an ancient reciprocal translocation between chromosomes 4AL and 5AL. A marker for *TmHKT1;5-A* was developed to track this gene in durum wheat breeding programs and this was also used to study the natural occurrence of *TmHKT1;5-A* in a range of wild diploid wheats.

The project gave Caitlin the opportunity to observe the transport of Na^+ by *TaHKT1;5-D* in *Xenopus laevis* oocytes, and develop transgenic wheat lines containing a construct designed to silence *TaHKT1;5-D* by way of RNA interference.

Caitlin's training and skills in a range of areas including electrophysiology, mapping, phenotyping, cloning and cereal transformation have made her a very employable young scientist.

Byrt CS, Platten JD, Spielmeier W, James RA, Lagudah ES, Dennis ES, Tester M and Munns R (2007) HKT1;5-like cation transporters linked to Na^+ exclusion loci in wheat, *Nax2* and *Kna1*. *Plant Physiology* 143:1918-1928

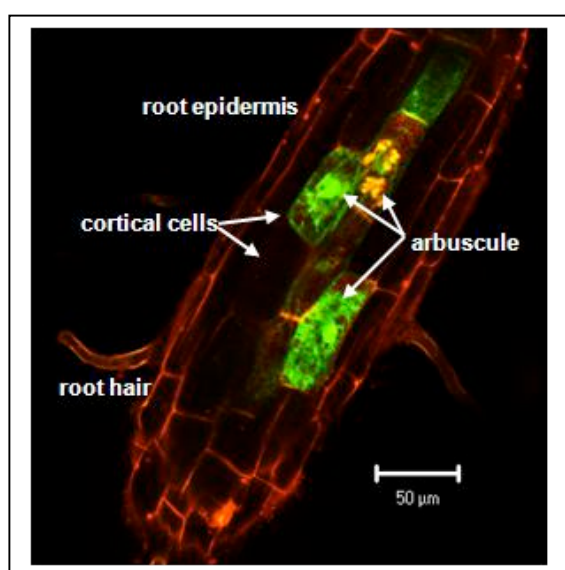
Caitlin Byrt

Uncovering hidden pathways for P uptake in cereals

Emily Grace is a recent PhD graduate of the University of Adelaide. Her research investigating phosphorus (P) uptake pathways in barley colonised by arbuscular mycorrhizal (AM) fungi has led to novel suggestions for improving P uptake in cereals.

AM plants have two pathways for P uptake. The direct P uptake pathway operates via root hairs and epidermis and the AM pathway via transfer of P from extraradical fungal hyphae into the root cortex. In many instances AM symbiosis leads to greater P uptake and plant growth; the extra P in the AM plants is attributed to the AM pathway. But not all plants grow better when they are colonised by AM fungi. AM cereals are often smaller and take up less P than non-mycorrhizal controls. This has led to the belief that the AM symbiosis is non-functional in these species. But is this truly the case?

In order to test whether the AM pathway is operating in barley I used experimental pots incorporating ^{32}P labelled soil compartments that could only be accessed by AM fungal hyphae. This method enabled quantification of the actual “hidden” contribution of the AM pathway. I found that, although AM barley was smaller than the controls, AM plants took up 50% of total P via the AM fungus (Grace et al. 2009). This demonstrates that the AM P uptake pathway is functional in barley. It also indicates that P uptake via the direct pathway is reduced.



AM colonised barley root showing expression of GFP under the control of the *HvPT8*

I investigated the expression of plant P transporter genes in AM roots. The expression of *HvPT1* and *HvPT2*, P transporters involved in P uptake via the direct pathway, was not altered in AM roots. This suggests that decreased operation of the direct pathway is not directly related to changes in the expression of these plant P transporters. In contrast, *HvPT8* gene expression increased in AM roots as colonisation developed. Using a fluorescent reporter system I demonstrated that *HvPT8* expression occurs around fungal arbuscules in the root cortex, suggesting that *HvPT8* is involved in plant acquisition of P via the AM P uptake pathway.

The finding that the AM pathway “takes-over” from the direct pathway has considerable implications for research directed at understanding plant P uptake in the field. Barley is colonised under field conditions. In a survey of commercially grown barley in South Australia we found AM colonisation of barley roots at

all sites, in some instances colonisation was as much as 50% of the root length. If AM colonisation changes pathways of plant nutrient acquisition, studies in the absence of AM fungi may not directly reflect processes occurring in the field.

Decreased operation of the direct uptake pathway also provides an alternative explanation for growth depressions in some AM plants. We observed growth depressions in barley when AM colonisation was minimal. These growth depressions could not be attributed to C drain to the fungus (the usual explanation) and we suggest that it is due to decreased uptake of P via the direct pathway and hence reduced uptake overall (see Grace et al. *in press*, Smith et al 2009). The results also suggest a novel

approach to increase P uptake in AM cereals. If the AM and direct P uptake pathways can be manipulated so that direct uptake is maintained, and the AM pathway becomes additive, then we hypothesise that positive responses will follow.

This project was conducted jointly with Professors Sally and Andrew Smith in the Discipline of Soil and Land Systems, School of Earth and Environmental Sciences, and Professor Mark Tester and Dr Olivier Cotsaftis at the Australian Centre for Plant Functional Genomics. I am grateful for a Commonwealth Hill Scholarship.

Grace EJ, O Cotsaftis, M Tester, FA Smith, SE Smith (2009) Arbuscular mycorrhizal inhibition of growth in barley cannot be attributed to extent of colonisation, fungal P uptake or effects on plant phosphate transporter expression, *New Phytologist*, 10.1111/j.1469-8137.2008.02720.x.

Grace EJ, FA Smith, SE Smith (*in press*) Deciphering the arbuscular mycorrhizal pathway of P uptake in non-responsive hosts. In: Azcón-Aguilar C, Barea JM, Gianinazzi S, Gianinazzi-Pearson V, Eds. *Mycorrhizas: functional processes and ecological impact*, Springer.

Smith FA, **EJ Grace**, SE Smith (2009) More than a carbon economy: nutrient trade and ecological sustainability in facultative arbuscular mycorrhizal symbioses, *New Phytologist*, 10.1111/j.1469-8137.2008.02753.x.

Emily Grace

Functional Plant Biology

Editor-in-Chief: Dr Rana Munns Assistant Editor: Dr Yvonne Cheng

In March 2008, the new management structure of Functional Plant Biology was initiated with the appointment of Rana Munns as Editor-in-Chief and Yvonne Cheng as Assistant Editor. Over the next few months, 15 top international scientists were recruited as Associate Editors to handle papers in their areas of expertise. The current list is:

Associate Editors:

Tony Ashton, CSIRO Plant Industry, Canberra, Australia
 Murray Badger, Australian National University, Canberra, Australia
 David Cahill, Deakin University, Melbourne, Australia
 Manuela Chaves, Universidade Técnica de Lisbon, Portugal
 Mike Clearwater, Waikato University, New Zealand
 William Davies, Lancaster University, UK
 Graham Farquhar, Australian National University, Canberra, Australia
 Anna Koltunow, CSIRO Plant Industry, Adelaide, Australia
 Jian Feng Ma, Okayama University, Japan
 John Patrick University of Newcastle, Australia
 John Raven, University of Dundee, UK
 Jim Reid, University of Tasmania, Australia
 Sally Smith, University of Adelaide, Australia
 Steve Tyerman, University of Adelaide, Australia
 Michael Udvardi, Samuel Roberts Noble Foundation, Oklahoma, USA

As a result of the change in management, the rejection rate has increased (it is now about 80%) and the submission rate of excellent manuscripts has started to increase. I see FPB as having a special role in publishing multidisciplinary papers that provide new information about plant functions at the molecular, cellular and whole plant levels. I would like to consolidate the traditional strengths of the journal in the areas of photosynthesis, and plant adaptations to abiotic and biotic stresses, and to attract more papers that address food security and the problems of global climate change, and how plants function in a changing environment.

The relatively low impact factor of FPB at present (2.4) is due mainly to the lack of reviews. The IF for most journals is determined by their number of reviews, and papers with large numbers of authors. The impact factor for FPB will not reflect the changes in management until the IF for 2010 is published in 2011, that is, the citations in 2010 for papers published in 2008 and 2009. I expect the IF for 2011 to be double the present one, as we are planning to publish two reviews per issue.

Summary of papers over the last 2 years

Sources of submitted papers

Year	Australia	NZ	North America	Europe	Asia	Rest of World
2007	33	3	31	108	109	22
2008	51	6	34	108	107	24

Sources of published papers

Year	Australia	NZ	North America	Europe	Asia	Rest of World
2007	23	4	25	39	12	11
2008	28	3	18	43	28	3

Special issues published in 2008

- 'Measuring Impact of Climate Change on Plants' (Volume 35, Issue 6)
- 'Functional Structural Plant Modelling' (Volume 35, Issues 9 & 10)

Plans for the next years

- Virtual special issue on the 'Evolution of Plant Functions'. A series of reviews starting June 2009, and continuing for 12 months.
- Special issue on 'Plant Phenomics: from Gene to Form and Function'. This will be the proceedings of the 1st International Plant Phenomics Symposium, held in Canberra 21–24 April 2009. Details are on <http://www.plantphenomics.org.au>

FPB invites papers from ASPS members in all aspects of plant biology that contain significant new information about plant functions, especially in relation to the environment. Research papers are published within 6 months of submission, and review papers within 4 months of submission. Please contact me or an Associate Editor for more information.

Rana Munns, Editor-in-Chief
January 2009.

Dr Rana Munns
Chief Research Scientist, CSIRO Plant Industry
Email: rana.munns@csiro.au
President, Australian Society of Plant Scientists

Plants in Action ~ 2nd edition

a project of the Australian Society of Plant Scientists



Editorial team: Brian Atwell, Paula Jameson, Susanne Schmidt and Mark Tester



ASPS

batwell@rna.bio.mq.edu.au
paula.jameson@canterbury.ac.nz
susanne.schmidt@uq.edu.au
mark.testers@acpfg.com.au

A progress report on the 2nd edition of our textbook from Brian Atwell

The *Plants in Action* project is aimed at producing a second edition of the textbook that was first published in 1999. A long planning phase has resulted in a framework that has many characteristics of the first book but much new material and modern relevance. *Plants in Action* will tell the world of Australasia's contribution to plant biology.

There will still be 20 chapters but the four chapters covering aspects of Cell and Molecular Biology will be heavily revised and the final chapter will deal with human impacts of vegetation systems. Existing chapters on environmental plant biology will remain with strong sections on climate change and fire reflecting their rising importance in our world.

New Zealand science is well represented, with a healthy proportion of more than 100 writers coming from our colleagues across the Tasman.

We have not finalised a publisher but now have a clear product to offer and will soon formalise this. The proportion of web-based material is central to the discussion with publishers.

Funds are always valuable in such a project and while the ASPS has been generous and some external funds are secured, every dollar raised will translate into a better quality book. For example, we wish to add all the colour plates that we can include. All ideas are welcome!

So, the task of writing has begun. The editorial team is delighted to see the list of eminent names who have agreed to make this a world-class book. By each contributing a relatively small amount of science on a specialist subject, we will be able to weave together a resource of which our society can be proud. We thank our many members for their participation and feedback on improvements and we encourage further commentary. Most of all, we encourage writers to amass the best possible evidence available to educate another generation of plant biologists.

Brian Atwell

9 February 2009

Messages from our Sustaining Members

**Automate Any
Real-Time PCR System**

save time, save money, improve results!

CAS-1200™
automated PCR setup



Only 49 cm

The CAS-1200 is the only robot specifically developed for quantitative PCR setup

Use it with any real-time PCR system—all PCR tube formats and plate types are supported, including LC capillaries! It also interfaces with an upstream sample prep system with ease.

Experience the benefits of automation no matter what real-time PCR or sample preparation system you own.

Find out more...
www.PCRsetup.com

corbett
LIFE SCIENCE



Agrisera

SAPPHIRE
BIOSCIENCE

Plant Cell Antibodies

LHC PSI PSII Rubisco HSP NifH COXII Idh FtsH
LOX FeSOD GR GS FtsZ PEP PhyA AtpB

**Environmental Stress, Photosynthesis, RNA Metabolism,
Respiration, Nitrogen Metabolism, Developmental Biology**



Antibodies for Model Species:

Arabidopsis thaliana, *Hordeum vulgare*,
Chlamydomonas reinhardtii, *Cyanobacteria*

For more information: www.agrisera.com/shop
To order please contact Sapphire Bioscience on +61 2 9698 2022
sales@sapphirebioscience.com ♦ www.sapphirebioscience.com

From Our Seed Banks

Meeting reports provided by members from around the country

“Plant Functioning in a Changing Global Environment”

2008 Symposium

of the

APGC Series “Air Pollution and Global Change”

From 7-11 December, the Creswick Campus of the University of Melbourne (Melbourne School of Land and Environment, Department of Forest and Ecosystem Science) hosted the 2008 Symposium of the APGC Series (“Air Pollution and Global Change”), titled “Plant Functioning in a Changing Global Environment”. The previous symposia in the Series were held in Oxford, UK, 1982, Munich, Germany, 1987, Blacksburg, USA, 1992, Egmond aan Zee, The Netherlands, 1997, Pulawy, Poland, 2001 and Tsukuba, Japan, 2004. The aim of the APGC Symposium Series is to bring together scientists of various disciplines, who are actively involved in research on responses of plant metabolism and functioning to air pollution and global change.

Despite some late minute cancellations owing to the blockade of Bangkok Airport, the symposium had 70 registered participants from 17 countries. The mix of eminent senior scientists with top mid-career researchers, post-docs and postgraduate students was particularly well received and inspired lively discussions. The ‘bush setting’ of the Creswick campus contributed significantly to the collegial and concentrated atmosphere of the conference, which was instrumental in developing new collaborative visions and ideas. Not least, thanks to the cooperation of our resident Kookaburras, Magpies, and the reliable local mob of Eastern Grey Kangaroos, our overseas participants were exposed to a clichéd, if somewhat chillier than expected (meteorologically speaking), impression of Australia.

The scientific programme (accessible on <http://www.apgc.eu>) comprised sessions on the interaction of plant function with the atmosphere including elevated CO₂, the effects on plant functioning of climate change factors such as drought and temperature, and the role of plant function in mitigating climate change efforts. In all sessions, overview lectures were given by international leaders in their field, complemented by focus lectures presenting specific research results, and a range of excellent poster presentations.

The session on plant interactions with a changing atmosphere was opened by an overview of atmospheric chemistry and the exchange of gases by plants given by **Stanislaw Cieslik** (Joint Research Centre of the European Union, Ispra, Italy). **Hideyuki Shimizu** (National Institute for Environmental Studies, Tsukuba, Japan) contributed impressive facts about air pollution effects in East Asian regions, among many others citing from his group’s work on O₃ and Asian crops cultivars, or studying the effects of pollution on arid and semi-arid ecosystems in Northeast Asia. **Luit De Kok**’s (Associate professor at the University of Groningen, The Netherlands) lecture pointed out that pollutants (particularly sulphur and nitrogen containing ones) are both nutrients and toxins for plants, often depending on the nutritional status of the soil. The discovery and further characterisation of plant sulfite oxidase, an enzyme potentially contributing to sulfur dioxide detoxification in plants but probably of even wider importance in plant metabolism, was core in **Ralf Mendel**’s (Professor at Braunschweig University of Technology, Germany) lecture on molecular aspects of pollutant impacts. The importance of below-ground processes, including nutrient cycling and trace gas exchange, in studying ecosystem effects of air pollutants and high CO₂ was demonstrated in **Sirku Manninen**’s (University of Helsinki, Finland) overview lecture.

There is no room to adequately cover all the excellent contributions by focus lectures and posters in this session, so an arbitrary selection must suffice. FACE- and chamber study results gave an idea of wheat yield and quality (**Petra Högy**, University of Hohenheim, Germany), photosynthetic acclimation of wheat (**Saman Seneweera**, University of Melbourne), wood quality of spruce (**Katri Kostianen**, Finnish Forest Research

Institute), the photosynthetic physiology of Boston fern (**Satoshi Kitaoka**, Hokkaido Research Centre, Japan), the chemical fractionation in ponderosa pine (**David Olszyk**, Environmental Protection Agency, USA), or the biochemical and anatomical traits of beech and spruce foliage (**Madeleine Günthardt-Goerg**, Swiss Federal Research Institute) in a future - high CO₂, often in combination with other global change factors such as nitrogen impact or ozone - world.

A detailed 3D dissection of the ozone damage on leaves was conducted by **Ryosuke Endo** (Nihon University, Japan), whereas bigger picture models were presented for air pollution risk assessment in Japanese beech forests (**Makoto Watanabe**, Hokkaido University, Japan), stomatal flux of air pollutants in East Asian forests (**Yasumoto Hoshika**, University of Tokyo), and for estimating the ozone effects on rice under global warming (**Yoshihisa Kohno**), supported by cultivar specific sensitivity assessments for rice (**Hiroko Sawada**, both from the Central Research Institute of Electric Power Industry, Japan), or effect assessment on yield and quality of canola (**Karine Vandermeiren**, Veterinary and Agrochemical Research Centre, Belgium). These scenarios were complemented by field studies evaluating anthropogenic pollution impact on semiarid plant species in Inner Mongolia (**Hideyuki Shimizu**, National Institute for Environmental Studies, Tsukuba, Japan), natural volcanic air 'pollution' impact on lichen physiology (**Taufik Taufikurahman**, Institut Teknologi Bandung, Indonesia), or field assessments of climate change impacts on city trees in Shanxi, China (**Liangmin Wang**, Shanxi Agricultural University), and agricultural production in Japan (**Toshihiko Sugiura**, National Institute of Fruit Tree Science, Japan). Additional points of view on the plant-atmosphere interactions were added by **Ilemobayo Oguntimehin** (Hiroshima University, Japan) who studied the ecophysiological effects of polycyclic aromatic hydrocarbons on plants, and **Tina Bell** (University of Melbourne) who alerted to the contribution of bushfire-caused volatile organic carbon emissions to the atmospheric chemistry. A poster by **Nataliya Taran** (National University, Ukraine) investigated climate change effects on one of the few Antarctic higher plants, *Deschampsia antarctica*.

Detailed physiological and molecular studies included the exciting results of **Luit De Kok's** group on the interaction of UV and copper toxicity presented by **Muhammad Shahbaz** (University of Groningen, Netherlands) and **Mei-Hwei Tseng** (Taipei Municipal University, Taiwan), the role of sulphate availability for plant metabolism (**Rainer Höfgen**, Max Planck Institute Golm, Germany), or ways forward to assess the turnover antioxidative defence systems in plant cells (**Didier Le Thiec**, INRA, France). Detailed molecular studies also addressed salt resistance (**Keumhwa Kim**) and heat and osmotic stress in rice (**Eunji Um**, both Chonnam National University, Korea). **David Olszyk** (Environmental Protection Agency, USA) presented a scoping study to distinguish ozone- and herbicide-related transcriptional responses in plants.

In the following session on the interaction of plant function with climate change, **Erwin Dreyer**, principal researcher at INRA, France, underlined the significance of water-use efficiency of trees, citing from the rich research results on the variability of water use efficiency among and within species. In particular, the tight genetic control over carbon isotopic discrimination (a surrogate for water-use efficiency) opens up new research and selection perspectives. **Malcolm Hawkesford**, principal investigator at Rothamsted Research, UK, put into a chiefly agricultural perspective the nutrient requirements and acquisition strategies of plants, including some work his group does on the famous world's oldest continuous agricultural experiment in Rothamsted. In particular, the de-convolution of the hugely complex traits of nutrient use efficiency was pointed out as a way to identify targets and strategies for improvement. **Heinz Rennenberg**, professor and dean of forestry at the University of Freiburg, Germany, added the tree, forest and ecosystem perspective to the nutrient question giving a synopsis of his group's leading work on nitrogen balance of forests as affected by global change. He pointed out that nitrogen balance of those forests not exposed to anthropogenic nitrogen inputs is greatly vulnerable under climate change, and temperature, drought, and flooding effects on root uptake and its interaction with mycorrhizae and soil biota need to be considered. **Markus Löw**, post-doc at the University of Western Sydney, presented results of the research on combined temperature/CO₂ effects on the physiology of eucalypt species on behalf of his group leader **David Tissue**. **Charles Warren**, QEII fellow at the University of Sydney, added aspects of internal CO₂ conductance in leaves on interpreting the photosynthetic nitrogen use efficiency, and also discussed the preferences of eucalypt trees for the different forms of nitrogen. **Kouki Hikosaka**, Associate Professor at Tohoku University, Japan, gave his lecture in the session about mitigation of global change, but it added valuable insight to the present theme, as he showed among others that Rubisco-use efficiency explains most of the interspecific variation in photosynthetic rates, whilst nitrogen allocation to Rubisco had a smaller, albeit still significant, contribution.

To name just few of the many other highlights in this session, **Ros Gleadow** (Monash University) presented climate stress effects on the cyanide metabolism in plants with potentially catastrophic consequences for people dependent on cyanogenic plants, such as cassava, as food staples. **Kim Nauts** and **Joke Van Der Berge**, PhD students at the University of Antwerp, Belgium, presented their first results on complex stress interaction experiments, where they tested stress combinations and included competition effects among species. **Sirkka Sutinen** (Finnish Forest Research Institute) used microscopy to refine phenological models of budbreak in spruce to assess effects of a changing climate in the Far North (not Queensland, but towards the arctic), and **Katja Tielbörger** (Professor at the University of Tübingen, Germany) showed via results of a 7 year irrigation study that arid Mediterranean ecosystems do not change fast. **Cordula Schmitz** (University of Groningen, Netherlands) presented a review on the temperature dependence of plant respiration to test the validity of the Arrhenius relationship.

It is also interesting to note that a number of presentations addressed inter- and intraspecific variability. Examples are Eucalyptus species comparisons of temperature responses by **Yan-Shih Lin** (University of Western Sydney), within-species comparison of light use and antioxidative defence in radiata pine by **Sabine Posch** (University of Melbourne), transpiration efficiency in peanut by **P. Ratna Kumar**, (ICRISAT, India), or of C sequestration efficiency of vetiver grass by **Piyanut Khanema**, (Suranaree University of Technology, Thailand). Further communalities could be found in the use of natural microclimatic gradients as surrogates for climate change. For example, **Gerald Page** (University of Western Australia) used microsite differences to assess climate change impact on *Acacia aneura* phyllode shape and water use, or **Thomas Wright** (University of Melbourne) used edge-interior contrasts in woodland remnants to characterise gas exchange of the understorey species *Leptospermum myrsinoides*.

The relationship of plant function and potential mitigation of global change was impressively demonstrated in **John Innes'** (Professor at the University of British Columbia, Canada) overview on the role of sustainable forest management in climate change mitigation. He pointed out the link between our fundamental knowledge on forest ecosystem function and the available choices for management. In particular, any attempt on mitigation must also consider adaptation of forest ecosystems to future climates. **David Ellsworth** (Professor at the University of Western Sydney) analysed the carbon sequestration capacity of trees and forests and noted that greatest C sequestration is reached on high-nutrient or fertilised sites, which has strong implications for management decisions with respect to maximise C sequestration using Australian native species.

The session was completed by a stress physiology study of *Allocasuarina luehmannii*, a significant species for restoration and carbon sequestration in Australian native woodlands (**Lauren Bennett**, University of Melbourne), and a suggestion that plant sulphur nutrition can contribute to degradation of ground level ozone (**Elke Bloem**, Julius Kühn-Institut, Germany). Modelling efforts were presented to evaluate the long-term sustainability of certain tree species under climate scenarios (**Craig Nitschke**, University of British Columbia, Canada), the usefulness of different tree types in carbon sequestration (**Endah Sulistawati**, Institut Teknologi Bandung, Indonesia), or the estimation of net ecosystem exchange of forests (**Tomohiro Hajima**, University of Tokyo). **Yutaka Urano** (University of Tokyo) demonstrated the usefulness of particular horticultural cultivars in air purification and cooling. It is also noteworthy that the latter represent two of the multiple contributions and collaborations of the group of **Kenji Omasa** (Professor at the University of Tokyo).

We are now in the process of collecting submissions for special issues in Annals of Forest Science and Plant Biology comprising highlights and special aspects of the exciting science presented at the symposium. As the main organiser, I would like to thank all members of the organising committee and the staff at the Creswick Campus for their excellent support, and primarily all the participants for making the APGC 2008 a memorable and greatly interactive conference.

Michael Tausz

*Department of Forest and Ecosystem Science
Melbourne School of Land and Environment
The University of Melbourne*

Tel +61 3 5321 4310

Fax +61 3 5321 4166

E-mail michael.tausz@unimelb.edu.au

http://www.forestscience.unimelb.edu.au/people/staff/michael_tausz



Fig. 1. APGC-2008 participants in front of the main reception of the University of Melbourne's Creswick Campus



Fig. 2. Lecture by Heinz Rennenberg (University of Freiburg, Germany).

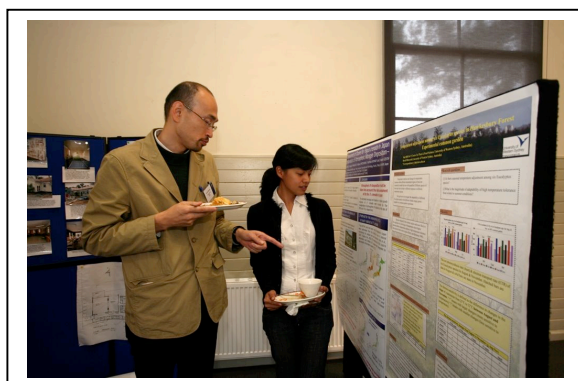


Fig. 3. Poster discussion. Kouki Hikosaka (Tohoku University, Japan) and Yan-Shih Lin (University of Western Sydney).



Fig. 4. Poster discussion. Front: Muhammad Shahbaz (University of Groningen, Netherlands), in the middle: Malcolm Hawkesford (Rothamsted Research, UK), in the background Rainer Hofgen (Max Planck Institute Golm, Germany: left) and Saman Seneweera (University of



Were you aware that....?


- ASPS Website.** The ASPS website has been thoroughly revamped and is being continuously upgraded.


 - Membership dues can now be paid on line.
 - You can advertise jobs, PhD scholarships, conferences, books by contacting Kiran Sarfaraz via advertise@asps.org.au. To cover the costs involved, the society has introduced a small charge of \$30 for members and \$70 for non-members **FOR EMPLOYMENT ADS ONLY**. Advertising conferences and books (edited by society members or containing chapters written by society members) are **FREE OF CHARGE**.
- RN Robertson Travelling Fellowship.** This named Fellowship recognises and celebrates the sustained contribution made by RN Robertson (Sir Bob) in nurturing young plant scientists in Australia spanning across four decades from the 1950's. The Australian Society of Plant Scientists is indebted to Hank Greenway and Joe Wiskich who generated and championed the early development of the RN Roberston Travelling Fellowship.
- Student Travel Funds.** Funds are set aside each year to sponsor student travel to our annual conference (this year in New Zealand), and contribute to their professional development in plant science. Support will vary from year to year depending on the Society finances, location of meeting and number of applications. The Treasurer will apply a formula in calculating individual entitlements and takes these factors into account. Applicants must be financial members of ASPS and presenting a paper or poster at the ComBio meeting.
- Postgraduate Section.** We are proud to announce that student members who have recently completed their PhD and had their thesis passed can submit a summary that features in Phytogen. The editors feel that this is an important opportunity for our postgraduate students to showcase their research. Such successful student members are advised that the summary can be accompanied by a key image in suitable format and that they should submit their items to the editor of Phytogen at any time for inclusion in the next issue.
- Society Funding for Workshops and Conferences.** The society has a total of \$10,000 available each year to provide seeding money and sponsorship for up to four conferences organised by members. The amount available to assist each conference will be about \$2,500. For more details see the website: <http://www.asps.org.au> and take the link to conferences.
- Corresponding and Life Memberships.** Life Membership recognises an outstanding and sustained contribution to the Society by a long standing ASPS member who, through their professional activities, has substantially enhanced the international profile of Australian plant science research. Corresponding Members are high profile overseas colleagues who have contributed substantially to plant science research within Australia. If you know of a deserving recipient for Life or Corresponding Membership, please consider putting a nomination forward. The procedure to follow is outlined on the ASPS website (see: <http://www.asps.org.au> and click on "About ASPS" where there is also a list of Life and Corresponding members).


A Message from one of our Sustaining Members

QIAcube — pure efficiency

New





Winner of the NPA Product Award (PMA)
Designation of the Association for
Laboratory Automation (ALA) 2007


reddot design award
winner 2007

- Eliminate manual processing steps
- Continue to use trusted QIAGEN spin-column kits
- Free up your time with affordable, automated sample preparation
- Purify DNA, RNA, or proteins from up to 12 samples per run
- Standardize your results and increase your productivity

Contact QIAGEN today or visit www.qiagen.com/MyQIAcube.


QIAGEN®

Sample & Assay Technologies