Phytogen May 2016

ComBio2016 provisional symposium schedule

19 May 2016

ComBio2016: 3-7 October 2016 – Brisbane Convention & Exhibition Centre
ComBio2016 is a combination of the ASBMB, ASPS and ANZSCDB Annual Meetings
Early Registration & Abstract Deadline: Monday, 27 June 2016

Dear Past and Present Members
We are pleased to advise that the ComBio2016 provisional symposium schedule

is now available and can be downloaded
from http://www.asbmb.org.au/combio2016/symposia.html
The latest program timetable can also be downloaded
from http://www.asbmb.org.au/combio2016/timetable.html

Overseas plenary speakers can be viewed
at: http://www.asbmb.org.au/combio2016/plenary.html Most of the photographs and biographies of these prestigious scientists can now be viewed from this page.

The latest advertisement for the conference which includes the overseas plenary speakers and the conference themes can be downloaded
from: http://www.asbmb.org.au/combio2016/ – please see the bottom right hand side of this page. It is also available at: http://www.asbmb.org.au/combio2016/timetable.html
We would be most grateful if you could download a copy of this advertisement, distribute to colleagues and pin on your departmental noticeboards.

Online registration and abstract submission is open and you can register at:
http://www.asbmb.org.au/combio2016/registration.html
and submit your abstract at:
http://www.asbmb.org.au/combio2016/abstracts.html

Please note that you need to register prior to submitting your abstract.

We have held blocks of well priced accommodation close to the Brisbane Convention Centre, and have recently secured two bedroom/two bathroom apartments at $268/night (only $67/night per person with four sharing the apartment). Details can be found at: http://www.asbmb.org.au/combio2016/accommodation.html
and you can also view photographs of the individual hotels on this page. Hotel bookings can easily be made when you register and should not be made directly with the hotels.

Further information: Sally Jay: combio@asbmb.org.au

ComBio 2015 Travel Grant Report by Millicent Smith

19 May 2016

PhD Candidate, Centre for Carbon Water and Food, Faculty of Agriculture and Environment

The University of Sydney

As an ASPS travel grant recipient I was able to attend ComBio 2015 to present research from a collaborative project between the University of Sydney and Forschungszentrum Jülich. The mobile nuclear magnetic resonance sensor (mNMR) recently developed at the Bio- and Geosciences Research Institute (IBG-2) at Forschungszentrum Jülich in Germany allows the non-invasive, real-time measurement of water status and dry matter accumulation during seed development. My PhD research focuses on the impact of drought and nutrient deficiency on photosynthetic capacity in common bean and the conversion of this energy into yield, particularly the nutritional quality of yield. Plant phenotyping technologies have an important role to play in this area and are evolving quickly to provide real time information about plant growth and development. It is an exciting field and it was great to share my research with the scientific community at ComBio.

The conference helped me improve my confidence and communication skills through having interesting discussions with other researchers about the future applications of the mNMR sensor technology. I am now determined to write up a manuscript sooner rather than later! Being exposed to a broad scope of research presented at COMBIO that is beyond what I would normally explore has made me excited about the possibilities awaiting me as a young member of the Australian plant science community. I am very grateful to the Australian Society of Plant Scientists for providing an opportunity to travel to ComBio in 2015.

C4 photosynthesis in a genus of succulents native to Australian salt lakes

11 May 2016

R.N. Robertson Travelling Fellowship Report by Nicole Dakin

(School of Chemistry and Biochemistry, University of Western Australia)

At first, you wouldn't think there was much connection between a snow-covered forest in Germany, and a sunny salt lake in Australia. My PhD project investigates C_4 photosynthesis in *Tecticornia*, a genus of succulents native to Australian salt lakes (Photo 1). Through the support of the R.N. Robertson Travelling Fellowship, I travelled to Mainz, Germany to complete part of my research, supervised by Dr. Gudrun Kadereit at the Johannes Gutenberg Universität Mainz.



Photo 1: *Tecticornia indica* subsp. *bidens*, a C_4 species. An example of a vegetative article is shown.

Tecticornia is a genus in the family Chenopodiaceae. These plants are halophytes, and the majority of species are endemic to Western Australia. *Tecticornia* species have highly reduced features, an adaptation to the harsh conditions in which they live. Their stems and leaves are fused into cylindrical structures called vegetative articles (see photograph included). Their flowers are embedded in these vegetative articles, with only the stamens visible. This leaves few morphological features to identify species, and discerning between species can be challenging. In addition, hybridisation and variation in ploidy levels are common. Previous phylogenetic studies have found low genetic diversity between species. The phylogeny of the genus remains unresolved, and the relationships among the species are not clear.

Tecticornia currently includes two C_4 species and 39 C_3 species. These C_4 species among a large number of C_3 species make it an interesting genus for studying the steps in the evolution of C_4 photosynthesis. The evolution of C_4 photosynthesis involves changes in anatomy, protein localisation, and expression, and my PhD project sets out to study these steps in *Tecticornia*. However, before these studies can be completed, the C_3 species most closely related to the C_4 species must be identified.

My aim during my time in Germany was to use the external transcribed spacer (ETS) region as a nuclear marker to construct a phylogeny of the genus. Previous studies have used chloroplast markers and the internal transcribed spacer region (ITS) marker, and information from the ETS marker would further contribute to resolving the phylogeny of the genus.

A question I was asked a lot was “Why would a Western Australian student, studying a Western Australian genus, come to Germany?” Members of the Kadereit lab (Photo 2) are experts in the family Chenopodiaceae, conducting studies into the phylogenetics, biogeography, anatomy, and taxonomy of a wide range of species in this family. Members of the lab have completed

studies into particular genera, and broader-scale studies of the family, and have integrated these studies with their extensive knowledge of the biology of the plants.



Photo 2: Ice-skating with Gudrun, and other students from the Kadereit lab.

I learnt how to extract total DNA from dried herbarium tissue, amplify the ETS fragment, and determine sequences from over 70 samples. These sequences were aligned, and I was taught how to use various programs to construct phylogenetic trees. The phylogenetic reconstruction was a lot more challenging than first expected. The amplification of paralogous sequences caused unusual branch lengths in the first trees constructed, and conflict between trees using different markers. Some samples had to be repeated with different primer pairs to obtain the orthologous sequences. The amplification of paralogues is an unusual problem, and is thought to be due to recent hybridisation between species.

The ETS phylogeny, combined with the ITS marker, had greater resolution compared to previous studies. A number of well-supported clades could be seen, dividing the genus into groups. The position of the C_4 species indicates they form a separate clade. The phylogeny revealed that the *Tecticornia* are a very young C_4 lineage. A rapid diversification and hybridisation, as seen from the paralogous sequences, make it a challenging genus to fully resolve. The information from this phylogeny will help choose further markers to fully resolve the species relationships in the genus.



Photo 3. A snow-covered scene in the Lennebergwald forest, Mainz.

I was also able to connect my findings with other studies. For example I was able to fit my phylogeny into a larger ETS phylogeny of a subfamily of Chenopodiaceae. My study, as well as increasing knowledge of *Tecticornia,* will also be valuable in resolving relationships across the whole family. I also picked up skills in hydrating dry herbarium material, and sectioning it to look at the anatomy; a difficult task for succulent tissue.

I used my free time to explore the city of Mainz. There was a beautiful forest close to where I was staying (Photo 3), and many museums and historical sites (Photo 4). Mainz, located on the Rhine River, has a rich history, and is the birthplace of Johannes Gutenberg, inventor of the first printing press.



Photo 4. Exploring the markets in the centre of Mainz.

Thank you to Gudrun Kadereit for her mentorship and teaching, and thank you to my other supervisors: Martha Ludwig from the University of Western Australia, and Kelly Shepherd, and Terry MacFarlane from the Western Australian Herbarium. Thank you to Silvia Wienken and Max Lauterbach, and the members of the Kadereit lab who gave me advice and help during my stay: Michael Pirie, Uschi Martine, Katherina Bohley, and Denise Schmidt. And thank you to the ASPS for the honour of receiving the R.N. Robertson Travelling Fellowship, and allowing me to undertake this research.

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ComBio2016 update, Science and Technology Australia newsletter and Global Plant Council E-Bulletin April 2016

09 May 2016

Your membership is paid to [wpmlfield name="paidtodate"] (Year, Month, Day)

- ComBio2016 – updated , timetable and Power Point
- Ulrike Mathesius represents ASPS on the Science and Technology Australia board and would like to forward a special newsletter for the federal budget that might be interesting for ASPS members. Available here.
- Global Plant Council E-Bulletin April 2016

Global Plant Council E-Bulletin April 2016

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E-Bulletin /
April 2016

Welcome to the latest issue of the Global Plant Council's monthly e-Bulletin, a round-up of plant science news, events, reports, funding opportunities, blog posts and other interesting information from the GPC community throughout April.

If you use social media, don't forget to follow us on Facebook or on Twitter (in English @GlobalPlantGPC o en español @GPC_EnEspanol) to read, like and share our posts. If you're looking for a new job in plant science, you might like to search for the hashtag #plantscijobs – we use this tag whenever we come across new job opportunities that we think will be interesting for our followers!

Latest News /
View more... If you have news you would like us to share on our website, please contact lisa@globalplantcouncil.org

New Phytologist Trust

This month 60 new breaking news stories were posted on the GPC website including...

In Nature Plants...

Scientists discover C4 photosynthesis boosts growth by altering size and structure of plant leaves and roots

Plants using C4 photosynthesis grow 20–100% quicker than more common C3 plants by altering the shape, size and structure of their leaves and roots, according to a new study.

Researchers find key to zinc rich plants to combat malnutrition

A milestone has been reached in the research of zinc loading in crop seeds with large potential benefits to people in the developing world.

Scientists uncover what makes plants 'clot'

University of Delaware researchers have identified two novel molecular players necessary to regulate plasmodesmata.

In Journal of Experimental Botany...

Stresses in the Big Bad World: Plants Can't Run

Jonathan Ingram reports on the latest JXBot Special Issue: The Interface Between Abiotic and Biotic Stress Responses.

Elsewhere in the news...

Feeding the World: Uncovering a Key Regulator of Flower Head Development in Rice

Chinese scientists have uncovered a critical regulator of *ELONGATED UPPERMOST INTERNODE1* gene expression in rice.

Scientists issue rallying cry for Wheat Blast research

A team of scientists in the UK and Bangladesh are turning to the combined knowledge of the global scientific community to address the emerging threat of Wheat Blast disease.

Events /

View more... If you have a conference, meeting, workshop, training course or other event coming up, we can include it in our Events calendar! Please email lisa@globalplantcouncil.org

State of the World's Plants Symposium
11–12 May 2016. Royal Botanic Gardens Kew, London, UK. 37th New Phytologist Symposium: Plant Developmental Evolution
15–19 May 2016. Beijing, China. 2016 Global Pulse Convention
19–22 May 2016. Izmir, Turkey.

UV 4 Plants 1st Network Conference
30–31 May 2016. Pécs, Hungary.

Meristem 2016: 1st International Conference on Plant Meristem Biology
9–10 June 2016. Tai'an, China.

Reports /

Lots of new reports, and an archive of useful documents from the last few years, are available on our website. Head to the Resources page and click 'Reports'.

Global wheat breeding provides billions in benefits, CIMMYT study shows
Coinciding with CIMMYT's 50th anniversary, a global network of crop scientists has published the report, "Impacts of international wheat improvement research, 1994-2014".
More...Robust outlook for global cereal supplies in 2016
Following the launch of its latest Food Price Index in March, the FAO has released a Cereal Supply and Demand brief revealing that world cereal production in 2016 is set to amount to 2,521 million tonnes.
More...

Funding Opportunities /

Spotted a funding opportunity we've missed? Please tell us about it by emailing lisa@globalplantcouncil.org

The Novo Nordisk Foundation has launched a call for nominations for its Novozymes Prize to raise awareness of basic and applied biotechnology research. The prize consists of DKK 2.5 million worth of funding for the awardee's research, plus a personal prize of DKK 0.5 million and the opportunity to host an international symposium within the awardee's field of research.
More info...

On the blog /

View more...Would you like to contribute an article to the GPC's blog? Please get in touch! Email lisa@globalplantcouncil.org

A Year at the Global Plant Council

In Amelia Frizell-Armitage's final blog post, she reports on what life has been like for the last 12 months as a GPC New Media Fellow.

More...Lessons from the Oldest and Most Arid Desert on Earth

Dr Susana Cabello from the Millennium Nucleus Center for Plant Systems and Synthetic Biology in Chile writes about plant science in a place where very few plants actually grow!

More...Witty Gene Names

Sarah Jose provides some light relief in this blog post exploring plant geneticists' sense of humor! What's your favourite funny plant gene name?

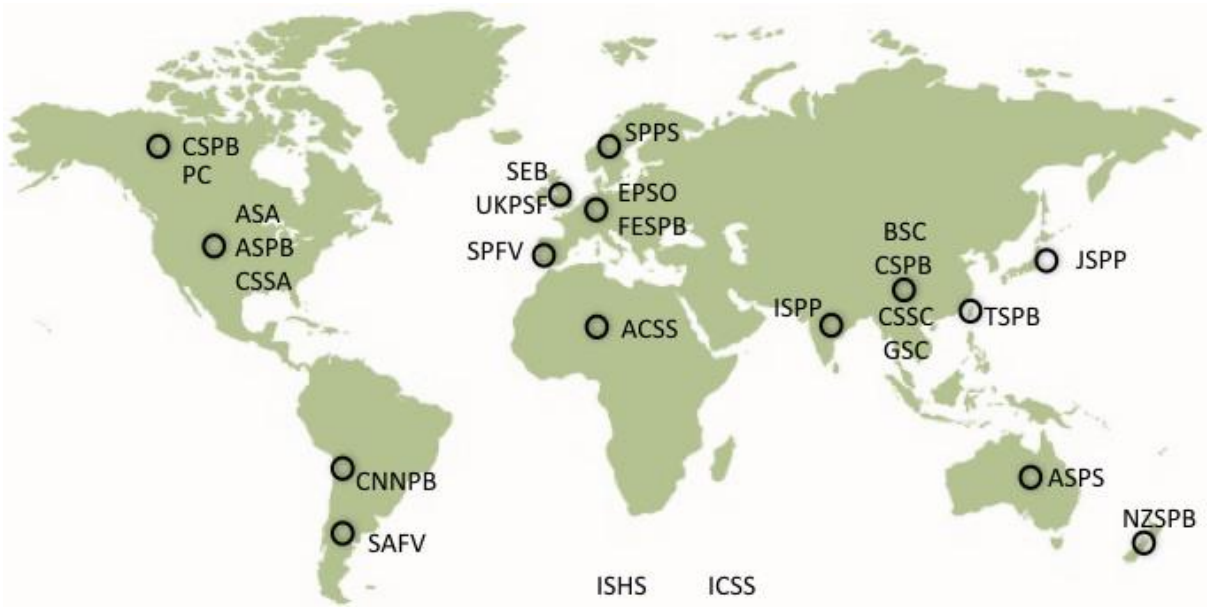
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Brexit and Agriculture

Representing the UK's Farmer–Scientist Network, Professor Wyn Grant highlights a new report discussing the future for British agriculture in the event of the UK's exit from the European Union.

More...

Members /



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Please contact Ruth Bastow (ruth@globalplantcouncil.org) to find out how your organization can join the Global Plant Council.

The Global Plant Council (GPC) is a coalition of plant, crop, agricultural and environmental science societies across the globe.

We seek to bring together all those involved in plant and crop research, education and training, to facilitate the development of plant science for global challenges such as world hunger, energy, climate change, health and well-being, sustainability and environmental protection.

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Characterisation of the low affinity ammonium transporters in maize

01 May 2016

by Wending Li

ASPS Travel Awards Recipients for ComBio2015

PhD candidate, Centre for Carbon, Water and Food, Faculty of Agriculture and Environment, The University of Sydney

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My research focuses on understanding ammonium transport in maize. In agricultural plant production, nitrogen fertilisers are used widely where ~10^{11} kg of nitrogen fertilizers are used annualy (Glass, 2003). The cultivation of cereals (wheat, maize, barley, rice) requires a significant amount of nitrogen fertiliser. Unfortunately, cereal N fertiliser use is poor, where only 30-50% of the total N applied is actually used for the production of the final grain yield (Raun and Johnson, 1999; Tilman et al., 2002). Low nitrogen use efficiencies can result in the loss of nitrogen into the environment, which causes water and soil pollution as well as greenhouse gas production (Masclaux-Daubresse et al., 2010). In addition, the waste of nitrogen fertilizers also gives rise to financial losses to the farmers, a significant cost in the production cycle. Therefore, improving plant nitrogen use efficiency (NUE) is an important strategy to overcome many of these constraints. One direction in enhancing NUE in plants is to increase the efficiency of root N transport processes. This includes, the proteins involved in the uptake of nitrogen from the soil as well as the internal storage and redistribution of nitrogen required to support growth and final seed yield and quality (Garnett et al., 2009).

Ammonium is a major form of nitrogen absorbed by plants and can be redistributed through high and low affinity pathways. The physiological and molecular activities of high-affinity ammonium transporters have been examined in numerous plant species, which belong to the AMT/MEP/Rhesus superfamily. Conversely, molecular information about low-affinity ammonium transport systems remains limited. Recently, our lab has discovered a new family of low affinity ammonium transport proteins called AMF1 (ammonium facilitator 1) (Chiasson et al., 2014). Through sequence homology, we found two AMF1 homologs in maize, which are *ZmAMF1;1* and *ZmAMF1;2*. I have been investigating the function of these two genes in maize as well as using heterologous expression systems (yeast and Xenopus laevis oocytes) to define their functional relevance in nitrogen transport and overall plant growth. In maize, I've observed Zm*AMF1* is induced by nitrogen starvation in roots, while both *ZmAMF1* and *ZmAMF2* are preferentially expressed in the shoots. The cellular location of both genes is currently being identified using a native promoter::GUS fusion construct transformed into the dwarf maize inbred line Gaspe. I have undertaken a reverse genetics approach in maize using a collection of *Mu* transposon insertion lines within exon and promoter loci of either *ZmAMF1* or *ZmAMF2* (provided by B. Meeley, DuPont Pioneer). We have progressed the transposon lines through a series of backcrosses to B73 and Gaspe using a diagnostic PCR screening assay. Mutant plants containing perturbations in ammonium transport in maize are undergoing characterisation. This project will contribute to a better understanding of the role AMF1 proteins in plant N transport and metabolism, including their role as low-affinity ammonium transporters. Our research will improve our understanding of nitrogen uptake and redistribution in plants, whiles also establishing new strategies to improve nitrogen use efficiency, plant growth and development.

Reference:

Chiasson DM, Loughlin PC, Mazurkiewicz D, Mohammadidehcheshmeh M, Fedorova EE, Okamoto M, McLean E, Glass AD, Smith SE, Bisseling T (2014) Soybean SAT1 (Symbiotic Ammonium Transporter 1) encodes a bHLH transcription factor involved in nodule growth and NH4+ transport. Proceedings of the National Academy of Sciences **111:** 4814-4819

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