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10 February 2017



The Homeward Bound Initiative

By Sandra Kerbler
PhD Candidate at the ARC Centre of Excellence in Plant Energy Biology,
The University of Western Australia

If you could change one thing in the world today, what would it be? I'm sure many of you reading this will be thinking of certain political leaders right now, but what about the issues a little closer to home? The ones you face each and every day? What about those that are long engrained, such that we don't even realise they are there sometimes? Seeing so many of my talented female colleagues leave science because it was just "too competitive" and that they "didn't have what it takes," the answer to this question was simple. For me, I would change the gender inequality in science and that's why I took part in Homeward Bound.

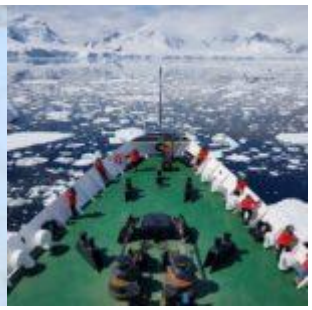
Homeward Bound is a leadership and strategy program for women scientists, set against the backdrop of Antarctica. Created by Australian leadership expert Fabian Dattner in collaboration with Dr Jessica Melbourne-Thomas of the Australian Antarctic Division, the program aims to equip a 1000-strong global collaboration of women scientists with the ability to lead, influence and contribute to policy and decision making, over the next 10 years. Homeward Bound was an incredible experience for me. Not only did has it helped me develop the skills needed to succeed in the upper echelons of science, but being part of a larger collaborative of women, all with a science background and all at very different stages of their careers has been truly inspiring.

If you would similarly like to improve the gender inequality in science and enhance your ability to lead constructively, plan strategically and communicate effectively to both scientists and non-scientists alike, please consider applying for the next Homeward Bound voyage in 2018. **Applications close on the 20th February, 2017**. For more information, please visit: https://homewardboundprojects.com.au or alternatively contact me directly at: sandra.m.kerbler@gmail.com

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Media videos of Homeward Bound can be found here.

ASPS President's letter and updated executive and discipline representatives web pages

05 February 2017

Your membership is paid to (year, month, day).

Hello ASPS members,

Meet your new Executive Committee and Discipline Representatives.

President's Letter

By Sergey Shabala

University of Tasmania

Dear Colleagues,

From January 1 I have the responsibility of leading the ASPS for the next two years. This is a great honour and a privilege, and I will try my best to ensure that plant science in Australia maintains its high international profile and continues to enjoy the strongest possible reputation. I would like to use this opportunity to thank John Evans, as the outgoing President, for the fantastic job he has done over the last two years taking ASPS community through the harsh realities of a modern-day academic and political life. I would also like to thank the outgoing Honorary Treasurer, Brent Kaiser, and Honorary Secretary, Martha Ludwig for their sterling efforts in running of the society over this period. I look forward to working with the new committee and hope that we can serve our members equally as well.

Next year the ASPS will celebrate a major milestone – a 60th anniversary since its establishment. All this time Australian plant science has been at a forefront of international research. I believe that it may be highly appropriate to try to highlight our major milestones and summarise achievements of Australian plant science over this period in an article and then disseminate it via media, and would encourage someone to put a hand up for doing this. Do I hear any voices from volunteers?

Last year I attended several international meetings in my field and was pleased to see great representation from Australian researchers amongst delegates. We are also doing extremely well in international rankings when it comes to various metrics. Of 115 Australian highly cited scientists listed by Thompson Reuters in 2016, 18 belong to plant science community. We are also doing remarkably well in the overall rankings, being 5th country after USA, UK, Germany and China. For a country with such a small population, this is a commendable achievement. And while we all know about the difficulties in getting ARC grants, our current success rate (18%) is much higher that in many other countries. So, I believe we have all the reasons to be optimistic and look for more exciting developments in our field in the near future.

It would be very tempting for me to stop at this point and simply wish you best success in your work. Yet, I do not want to leave an impression that our road is covered by rose petals and we do not have issues. Similar to many other disciplines, Australian plant science is facing some big challenges. Some of them are under our control and therefore could be resolved in the short-term, while other are systemic and will require much more efforts and time. One of immediate issues is changing a format of our annual meetings. At the last Combio conference all founding societies have voted unanimously to move away from the existing format making Combio meetings bi-annual events, and having smaller (society-specific) conferences every alternating year. While these changes will be implemented only from 2019, we will need to start making plans much earlier. Other issues that our discipline is facing are (in no specific order): gender equality in Academic positions in Biological Sciences; collegiality and peer support in our discipline; the quality and integrity of peer review, both for publication and grants; proliferation of 'predatory' and poor quality journals; and scientific literacy in the public domain. While all

these issues are not our discipline-specific, it is important that Australian Plant Sciences does its part in moving quickly towards resolving these or at least putting actions in place to initiate change.

Over the upcoming months the ASPS newsletter will feature viewpoints on these topics and more to stimulate discussion and propose ways in which our society can help promote change. For any of this to happen we need your input and support so we are calling for your active involvement – it is your society after all, and should be representing your views. You may also have additional things that the society should be working towards – so please get in touch.

This is all from me for now. I wish you a successful 2017 and hope it will be a year of new exciting discoveries, fruitful collaborations, and success for all of you.

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[January GPC E-Bulletin]

05 February 2017

Global Plant Council E-Bulletin January 2017

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E-Bulletin /
January 2017

Happy new year, and welcome to the first 2017 issue of the Global Plant Council's monthly e-Bulletin! We can't wait to see what amazing discoveries another year of plant science will hold!

The GPC's e-Bulletin is a monthly round-up of the latest plant science news, events, reports, funding opportunities and blog posts from the GPC community. If you have anything you would like us to help promote then please do get in touch! Contact Lisa, GPC's Outreach & Communications Manager: lisa@globalplantcouncil.org.

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

This month 49 new breaking news stories were posted on the GPC website including...

In *Journal of Experimental Botany*: Crop achilles' heel costs farmers 10 percent of potential yield
Crop ancestors evolved in an environment where most of their leaves were exposed to full sunlight, so lower leaves of modern crop plants cannot photosynthesize efficiently when shaded by overcrowded neighbors.

In *New Phytologist*: the Venus flytrap uses its prey's nitrogen compounds to extract energy
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Researchers at the University of Surrey and University of Queensland developed a revolutionary new crop protection technique which offers an environmentally-friendly alternative to genetically-modified crops and chemical pesticides.

Also:
Nature Plants celebrated its 2nd anniversary with a free collection of popular articles

Current Plant Biology issued a special issue on genomic resources and databases for its 3rd anniversary

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

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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'.

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EPSO acknowledges the interpretation of the EU GMO legislation as both process- and product-based and considers that this could help to clarify the legal status of the NPBTs. In its update EPSO includes recently published reports from Belgium and Italy.

On the blog /

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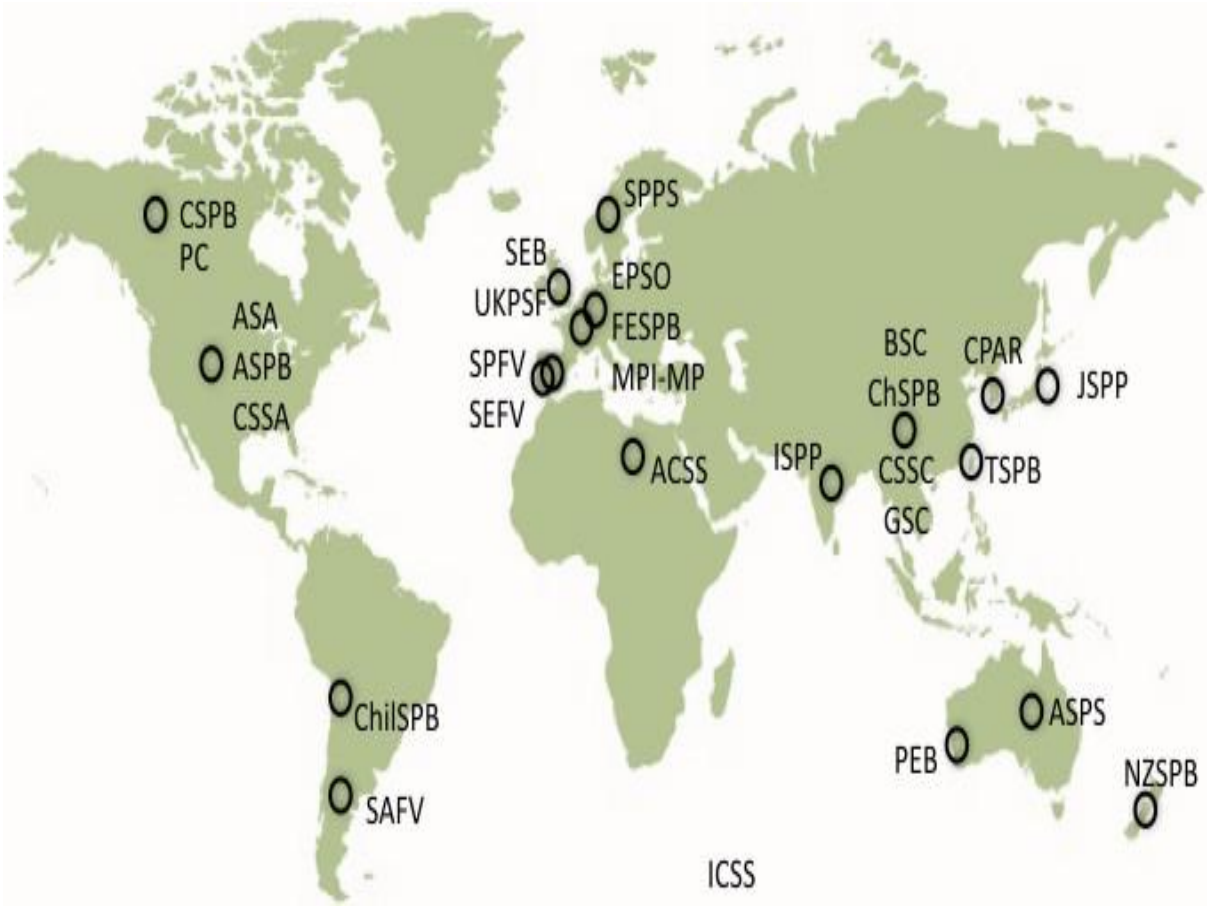
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Members /



Click here for details of the GPC Member Societies and Affiliates and their representatives.

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

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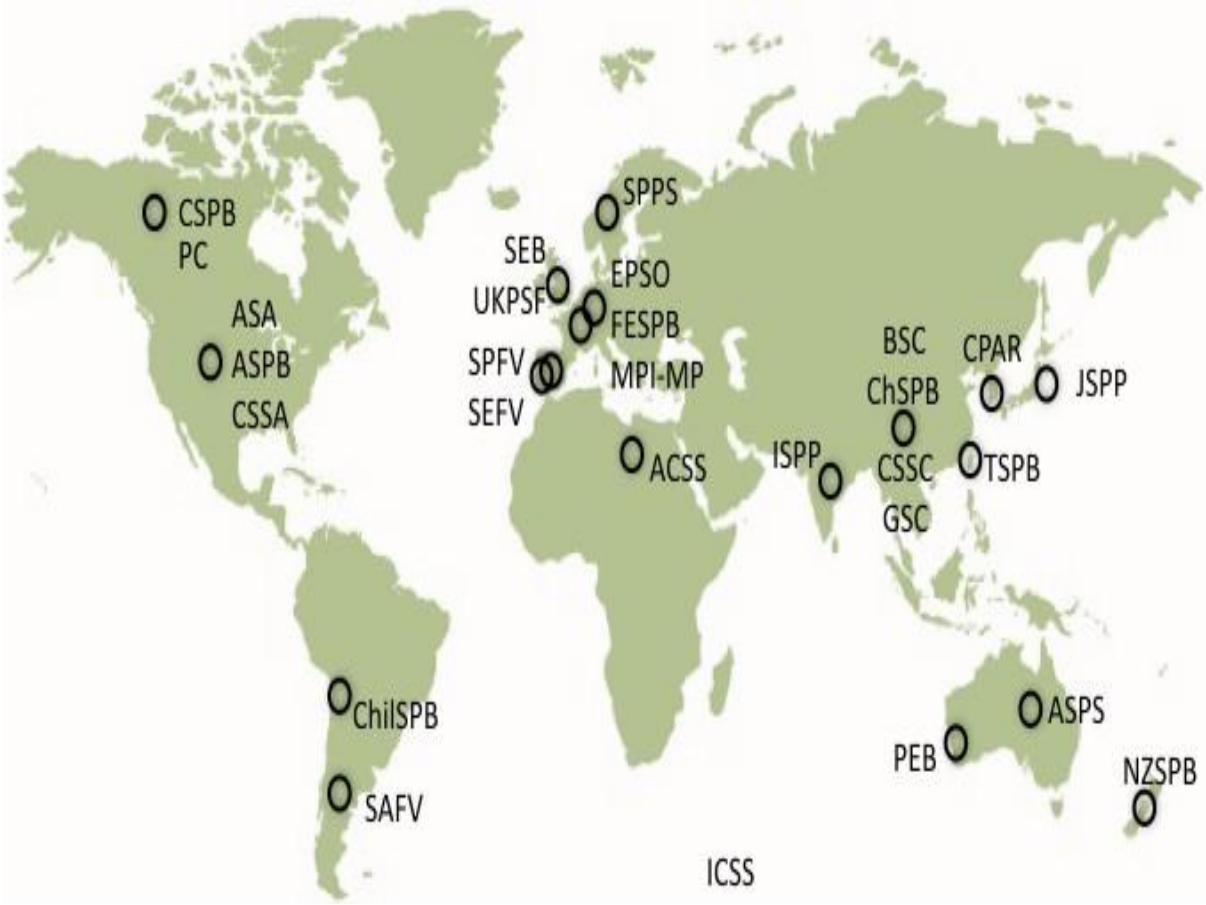
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Cyclotides: small plant defence molecules to drive pharmaceutical innovation

01 February 2017

COMBIO 2016 winner of the ASPS Student Poster Awards

Georgianna Oguis

Institute for Molecular Bioscience – University of Queensland, Australia

Plants have evolved quite a number of ways to evade predators. An obvious strategy for an organism incapable of rapid movement out of danger is to produce toxins. Whilst the most notable plant defence molecules are small molecule secondary metabolites, there exists great many peptides that are also expressed in plants. One such class of these peptides are known as cyclotides, and these have special properties worth talking about. The discovery of cyclotides goes back to 1973 when Norwegian doctor Lorents Gran discovered that the active ingredient of the herbal tea African women drink in order to induce birth is apparently an ultrastable peptide that can survive boiling and oral ingestion[1]. Gran named the molecule kalata B1—after the local name of the plant kalata-kalata (*Oldenlandia affinis*). Since then many other cyclotide-related studies spawned. However, it was only in 1999 that the term "cyclotide" was coined; and these specifically pertain to head-to-tail cyclised plant peptides which have three disulfide bridges that are arranged to form a knotted topology[2]. Cyclotides are found to exhibit a range of biological activities including anthelminthic, cytotoxic, molluscicidal and antimicrobial activities[3]. Other than these, cyclotides have very promising applications both in agriculture and in peptide-based therapeutics—the former being the hypothesised evolutionary role as an insecticide and the latter which can be attributed to their ultrastable properties (brought about by its cyclic structure and knotted topology), thus be used as frameworks for peptide drug engineering.

Before the year concluded in 2016, the first cyclotide-based bioinsecticide called Sero-X was made commercially available. The product was developed and is being manufactured by the Australian-owned company InnovateAg. The insecticide is currently being applied to control pests on cotton and macadamia crops. Although there are yet no cyclotide-based peptide therapeutics on the market, the possibility of this scaffold appearing in a commercial product may not be that far off as several proofs of the concept have already been published[3]. The main idea behind this is to "graft" or replace a number of native cyclotide amino acids with specific sequences which can target cancer cells, adipocytes, cell receptors, and possibly many other targets. By having these sequences grafted into the cyclotide scaffold, we are able to create ultrastable peptide therapeutics that are highly specific and would not interfere with healthy cells. There is repeated emphasis on "ultrastability", as this property is essential to improved peptide drug delivery and half-life. A particular peptide-based drug may be stable *in vitro* but when administered *in vivo*, an entire array of enzymes, compounds, acids and proteases plus the non-optimal environment can encumber peptide function, or lead to degradation. Another good point, or perhaps one of the best points of cyclotides, is that they are naturally produced in plants. This implies that we can utilise plants as biofactories for the production of these cyclotide-based therapeutics. The advantage of this plant-based system is that we are able to cheaply produce medicines in large quantities, making them affordable to all walks of life,

especially to people in developing countries who will finally be given VIP access to life's basic necessities.



My winning poster entry at ComBio 2016 entitled "The key drivers of cyclotide production in butterfly pea" is but a glimpse of a very big picture. I am part of a big group headed by Prof. David Craik, the driver of research in the areas of cyclotide therapeutic and plant biosynthesis of cyclotides. I would love to think of our group as a factory where we are categorised into several subgroups that are unified with a goal. For instance, the chemists and structural biologists synthesise and characterise the peptides. The cell biologists and biochemists subsequently test these peptides in vitro and in vivo. The molecular biologists and plant scientists then express the peptides of interest into the plants for possible mass production. I happened to be sitting at the end of the chain where my colleagues and I try to establish an optimised system for the production of pharmaceuticals in plants. The poster features one of the many aspects of production in plants we are looking at. In a nutshell, I want to know what drives cyclotide production in butterfly pea (*Clitoria ternatea*), as this specific plant expresses chemically diverse cyclotides in all life stages and in such great abundance. Once I have characterised the key drivers, I can potentially use these to drive the production of cyclotide-based pharmaceuticals in other plant systems that are economically important. In other words, we need to identify the best driver to race the fastest car in a professional team, and hopefully cross that finish line first to bag the golden trophy.

References:

1 Gran L. On the effect of a polypeptide isolated from "Kalata-Kalata" (Oldenlandia affinis DC) on the oestrogen dominated uterus. Acta Pharmacol Toxicol. 1973;33:400–8.

2 Craik DJ, Daly NL, Bond T,Waine C. Plant cyclotides: a unique family of cyclic and knotted proteins that defines the cyclic cystine knot structural motif. J Mol Biol. 1999;294:1327–36.

3 Oguis GK, Kan MW, Craik DJ. Natural functions and structure-activity relationships of cyclotides. Adv Bot Res. 2015;76: 187-226.

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