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Associate Professor Min Chen was presented with the $50 000 Science Minister's Prize for Life Scientist of the Year by Senator Kim Carr, Minister for Innovation, Industry, Science and Research, at an awards dinner held in the Great Hall of Parliament House, Canberra, on 12 October 2011. Credit: Prime Minister's Science Prizes/Bearcage

GREEN GOLD

Associate Professor Min Chen has won the Science Minister's Prize for Life Scientist of the Year for discovering the first new chlorophyll in over 60 years.

"I was surprised and pleased when I found out about winning the Science Minister's Prize for Life Scientist of the Year. I received a phone call telling me about the prize at 5am in the morning when I was at a conference in Finland, but I couldn't share my news with others at the time, because the news was confidential, so it was hard to keep quiet!" said Associate Professor Chen.

Having discovered a new chlorophyll in cyanobacteria from Western Australian stromatolites, Prof Chen won the award - part of the prestigious Prime Minister's Prizes for Science - for her contribution to our knowledge of one of the key molecules in photosynthesis.

"The prize means a lot to me – not only does it recognise my research, but it also recognises the importance of the research field of chlorophylls and cyanobacteria. It is very gratifying to have been selected for this prize by my scientific peers from Australia," she said.

Her discovery of chlorophyll f and work to determine its structure and function was published in the journal *Science* in August 2010 and attracted huge interest not only within the scientific world, but also industries related to agriculture, biofuels and solar cells. The newly discovered chlorophyll is able to utilise lower light energy than any other known chlorophyll, with its ability to absorb far-red light, and therefore has excited industries where capturing light energy is key.

Even before the discovery of the new chlorophyll made her name widely known in scientific circles, Prof Chen – still less than eight years out from her PhD – had become a recognised authority on photosynthetic cyanobacteria and chlorophyll d.

"I came to Australia with my husband as he'd been offered a job here as a chemist at the University of Sydney. At the time, there weren't any jobs available in plant physiology at the university, but Professor Tony Larkum in the School of Biological Sciences took me on as an honorary assistant in his lab," said Prof Chen.

After almost two years as a volunteer with Prof Larkum, she won funding to do a PhD working on chlorophyll d. Following her PhD, Prof Chen was offered postdoctoral fellowships around the world but chose instead to stay in Australia. She took up a postdoctoral fellowship at the University of Sydney, when she was successful in securing an Australian Research Council funding.

"My science career in Australia has been an amazing journey – from volunteering in a lab to completing my PhD and now running my own lab here. Winning the Science Minister's Prize for Life Scientist of the Year is truly exciting and an incredible honour."

IN THIS ISSUE

HEADSPACE

I am very pleased with the recent success of the school in winning prizes and grants.

Researchers won more than $3million of new research funding and three research fellowships from the Australian Research Council and National Health and Medical Research Council. Associate Professor Min Chen and Professor Michael Thompson and their colleagues each received grants of over half a million dollars. There was much excitement in the School and University when Associate Professor Min Chen was awarded the *Science Minister's Prize for Life Scientist of the Year* for her discovery of the first new chlorophyll in 60 years. Professor Shine won the *NSW Science and Engineering Award* for Plant and Animal Research for the excellence and impact of his research on the ecology and evolutionary biology of Australian reptiles and amphibians. Our success extended to teaching with Associate Professor Dieter Hochuli being awarded the 2011 *Co-op Bookshop Excellence in Teaching Award* for his outstanding record in student centred learning in the field of ecology.

The Alumni Day at Warrah in October was a wonderful success with alumni and their families enjoying a return to Warrah and its natural delights. I think we can look forward to similar events in the years to come. Next year we will celebrate the School's 50th Birthday including an exhibition at the Macleay Museum. If you have stories or photographs of your time in Biological Sciences at Sydney that you would like to share, please send them to biologyalumni@sydney.edu.au. We look forward to celebrating our 50 years with you in 2012.

This is the last newsletter to be edited by our Science Communicator, Carla Avolio, as she will be leaving us for Japan at the end of this year. I thank Carla for all that she has done for the School and our alumni in the past four years and wish her the best for her future in science and communication.

With warm regards

Robyn Overall

EDITORIAL

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RESEARCH SPOTLIGHT: BEN OLDROYD

Professor Ben Oldroyd is at the helm of three projects aimed at protecting Australia's billion-dollar honeybee industry

They pollinate one third of our crops and produce $60 million worth of honey in Australia every year: honeybees are the quiet workers behind much of the world's agriculture.

But recently, millions of honeybees around the world have died from a mysterious amalgam of diseases and factors known as Colony Collapse Disorder (CCD). Thought to be a combination of stress, overuse of pesticides and various diseases, CCD causes seemingly healthy honeybee colonies to go into sudden decline and is one of the prime causes of concern for beekeepers and farmers.

Fortunately, CCD has not yet afflicted Australian honeybees. One of the reasons may be that Australia is one of the few countries that remain free from the debilitating mite, Varroa. "It's remarkable that we haven't been infected by Varroa in Australia because it's in New Guinea, New Zealand and virtually everywhere else around us," says Ben Oldroyd, Professor in Behavioural Genetics. "But given how close it is to our shores already, it is only a matter of time before we are hit with this parasite."

A world authority on the genetics of behaviour in social insects, Prof Oldroyd's formative training in agriculture has given him a keen interest in the applied science of bee keeping. For this reason, when the Honeybee Research and Development Unit were looking for somebody to test the resistance of Australian bees to Varroa, Prof Oldroyd was willing to lend a hand. "The bee industry is trying to be proactive about Varroa coming to Australia in the near future. They wanted to see how Australian bees would cope with Varroa compared with bees from the US and Europe that have been living with the mite for many years," said Prof Oldroyd.

The research team, which included Tom Rinderer from the US Department of Agriculture, chose to run the study in Kansas, which has had the mite for over 20 years. There, they infected seven lines of Australian bees with the mite to see if there was any chance of survival. As a comparison, they also infected two US lines considered "mite resistant" plus one that was deemed "susceptible".

The results of their study show, not surprisingly, that Australian honeybees have no resistance to Varroa. While the US lines showed some survivorship during the trials, all seven Australian lines perished when challenged with the mite. "Our results show that if Varroa ever comes to Australia, our bees will be in deep trouble," says Prof Oldroyd. "The only option now is to start bringing in US bees so we can build up a genetically resistant stock before the inevitable time when Varroa reaches Australia."

The problem, however, is that Australia has banned the import of bees from the US for the last 20 years in an effort to prevent Africanized "Killer Bees" from plaguing our industry. The hybrid bees, which originated in Brazil, are considered a menace by beekeepers due to their aggressive nature, unpredictable pollination efforts and propensity to abandon their nest.

So how can Australia import US bees to prepare for Varroa, while still protecting our industry from Africanization? Prof Oldroyd's latest project, which involves developing a genetic test, is designed to address exactly this problem. "I am currently working on a single nucleotide polymorphism test, which can screen for Africanized bees. The goal is to do whole genome sequencing of African, European and feral Australian drones in order to find 60 genetic markers that identify a bee as Africanized. If this genetic test is successful then we can safely import semen from US bees, that are resistant to Varroa, without fear of introducing killer bees."

The SNP test is an example of how genetics can be applied to solve problems faced by the bee industry and is the sort of work that Prof Oldroyd hopes to roll out on a much larger scale. Together with scientists from three other states, Prof Oldroyd is bidding to establish a Cooperative Research Centre addressing Honeybee and Pollinator Security. The CRC will bring together scientists working on honeybee pathology (University of Western Australia), pollination (CSIRO ACT) and genetics/genomics (University of Sydney) with the aim of producing research that can improve the bee industry in Australia.

"It is my hope that through a united effort, we may finally be able to identify the genes responsible for traits that are important to beekeepers such as stinging and hygienic behaviour," said Prof Oldroyd. "We also know that at some point during the development of bee larvae, a gene is switched on that signals to Varroa to start feeding. If we can find that gene in the bee, and then silence it, we may be able to rid ourselves of that parasite forever."

CO-OP AWARD

Associate Professor Dieter Hochuli has won the 2011 *University Co-op Bookshop Excellence in Teaching Award* for his creative approach to using education resources in his courses. The award acknowledges Prof Hochuli's non-traditional approach to using existing resources and for innovative design of biology programs, which include ecology in the media in the postgraduate environmental science unit of study (ENVI15705); preparing high achievers for research in the advanced stream of Ecology course (BIOL3907); and teaching multivariate approaches to data analyses in the course Ecological Methods (BIOL3006).

In his teaching practice, Prof Hochuli goes out of his way to create different and innovative courses to engage his students and effectively build networks within the class. The "group approach" he implements in his courses fosters creativity and camaraderie amongst students from different backgrounds. This award recognises Prof Hochuli's outstanding track record in student-focused teaching.

GRANT FOR CITIZEN SCIENCE

Primary school children will be conducting their own ecological studies into ants in their local environment, thanks to a new grant won by Associate Professor Dieter Hochuli and masters student Melissa Slarp.

Prof Hochuli and Melissa Slarp were awarded one of the University of Sydney's new "Widening Participation" grants for their innovative project, which seeks to use citizen science to engage the broader community with scientific research at the University.

Through their project, the pair hopes to empower primary schools to produce their own ecological data, which will be fed back into the research program of the School of Biological Sciences. The increasingly popular "citizen science" method of engagement is a way of developing the community's understanding of their local environment, showcasing the biological research in the School while minimising the time commitments from both scientist and student.

The project will be based on ecological activities that are linked to NSW syllabus outcomes and centre around Prof Hochuli's research on ant communities. These will be designed by Melissa Slarp, a qualified teacher undertaking masters research on ecoliteracy in children.

As part of the project, primary schools will be sent kits containing sampling material and teaching tools so that classes can generate their own data on ants in their local bush. They will bait and trap ants, survey and monitor seed dispersal, and collect samples for the University. At the end of the experiment, the students will meet with scientists to follow up their findings.

Masters student Melissa Slarp has won a grant to engage primary schools in citizen science, which will allow them to monitor ant communities in their local area.

Prof Hochuli and Melissa Slarp were one of eight project groups in the Division of Natural Sciences to be awarded funding for Widening Participation projects. This year, grants totalling more than $700,000 have been awarded to faculties from across the University to support curriculum, research and community activities that improve engagement of students who are less likely to take part in higher education.

ARC GRANT SUCCESS

School of Biological Sciences researchers will investigate the role played by a newly discovered chlorophyll in photosynthesis, determine the physiological resilience of organisms to climate change and improve efficiency of nitrogen fixation, thanks to new government funding from the Australian Research Council.

Biologists from the School have won over $2 million in funding for six different Discovery projects starting in 2012.

The grants are part of the $310 million in federal government funding, administered by the Australian Research Council, announced by Innovation Minister Senator Kim Carr on 1 November.

Discovery projects led by Professor Mike Thompson and Associate Professor Min Chen are also among only seven projects in the University to be awarded over half a million dollars each in the recent funding round.

The School's projects are among 89 Discovery projects awarded to University of Sydney researchers, totaling $26.8 million in funding.

Head of School, Professor Robyn Overall, congratulated the successful applicants.

"This new funding will enable the School's researchers to make a real difference to sustainable agriculture, understanding cancer, predicting the effects of climate change, and also contribute to blue sky research in the fields of evolution and photosynthesis.

"I am particularly pleased by the success of our researchers who won some of the largest grants awarded to the University."

SCHOOL OF BIOLOGICAL SCIENCES' ARC GRANT WINNERS:

Prof Maria Byrne "Heads or tails - which did echinoderms lose in the evolution of radial symmetry?"

Associate Professor Min Chen "The role of chlorophyll f in photosynthesis"

Professor Benjamin Oldroyd "Genes in conflict in the social insects"

Associate Professor Frank Seebacher "Does physiological plasticity of individuals render populations resilient to climate change?"

Dr Penny Smith and **Professor Robyn Overall** "Nutrient transfer across symbiotic membranes in soybean"

Professor Mike Thompson "The link between the angiogenesis of live birth and cancer: a lizard model"

Associate Professor Glenda Wardle "Population fluctuations: models, mechanisms and management" (Administered by The University of Queensland. Principal investigator: Dr Yvonne Buckley)

Dr Will Figueira "Temperate trophic cascades: impacts of seal foraging on benthic community dynamics" (Administered by The University of Adelaide. Principal Investigator Prof Bronwyn Gillanders)

NHMRC WIN

Research into antibiotic resistance in the superbug "Golden Staph" has been recognised in the largest round of funding for health and medical research awarded in Australian history.

Associate Professor Neville Firth and Dr Stephen Kwong, from the Molecular Genetics Lab, have won a three-year grant from the National Health and Medical Research Council (NHMRC) for their project on the mechanisms of stable gene inheritance in multiresistant *Staphylococcus aureus*.

Prof Firth and Dr Kwong won their NHMRC funding – worth $599 685 – with colleagues Professor Maria Schumacher from Duke University, USA, and Dr Slade Jensen from the University of Western Sydney.

Together, they will continue studying the genetic basis of antibiotic resistance in the bacterium *Staphylococcus aureus*, or "golden staph", which is a major cause of serious hospital-acquired, and increasingly community-acquired, infections in Australia and around the world.

Prof Firth says his project will elucidate key aspects of the bacteria's genetic stability systems, which cause efficient inheritance of resistance genes, so that new drugs and ways to combat resistance can be devised.

SUNKEN WORLD WAR TWO DUTCH SUB DISCOVERED

BY KATH KENNY

A School of Biological Sciences academic has taken the first photographs of the sunken remains of a Dutch submarine that was torpedoed off the coast of Borneo by a Japanese submarine on Christmas Day in 1941.

Associate Professor Ross Coleman took the images while on a private diving expedition with a group of Australians on the Empress, a boat skippered by Vidar Skoglie, a Norwegian who has long been searching for the submarine, the HNLMS K XVI.

"The HNLMS K XVI wasn't where it was supposed to be when it was sunk," explains Coleman. "It hadn't reported in for 24 hours, and the Japanese submarine crew who torpedoed it didn't know exactly where they were either."

The Japanese submarine crew reported sinking an enemy submarine 60 miles north west of Kuching, Borneo. But it wasn't until October 4 this year that Skogle, Coleman and the other members of a technical diving expedition found the submarine on a deep exploration dive.

The HNLMS K XVI, which sunk with all 36 crew perishing, had been trying to stop the Japanese invasion of Borneo. As a war grave, the exact location of the submarine is a closely guarded secret. Since the discovery the Dutch Navy has confirmed the ship's identity by comparing Coleman's photographs with old pictures and construction drawings.

"The skipper Vidar had spoken to some fishermen who had reported a snag in an area that Vidar considered a likely sinking ground," explains Coleman, Director of the Centre for Research on Ecological Impacts of Coastal Cities at the University of Sydney.

Actually finding the wreck left him feeling both excited and relieved, he said.

"I was excited, as the last person to see that submarine was the Japanese commander of I-66. But I also felt relief that it had finally been found. And as we looked closely, it became more interesting to try to piece together what had happened."

The damage to the 75-metre long vessel was consistent with a torpedo hit, Coleman said. "It had broken its spine just behind the conning tower. It is covered in fishing nets and fishing line, but was otherwise largely intact apart from the damage due to the passage of time."

Vidar brought the submarine's steering wheel to the surface to help with identification. The skipper, Coleman and the other members of the diving team have now been invited to the Netherlands as guests of the Admiral Netherlands Fleet to hand over the steering wheel of KXVI to the relatives of the crew.

The conning tower steering position of the HNLMS K XVI, which sunk in 1941 off the coast of Borneo. In the picture are the steering wheel, compass binnacle and speaking tube for communicating with the control room. The hatch is open, possibly showing that one or more crew were on the conning tower when the torpedo struck. Photo by Ross Coleman

ALUMNI PROFILE: NOEL TAIT

Associate Professor Noel Tait (BSc 1959) has had a rewarding career studying one of the world's strangest creatures and inspiring generations of naturalists with his passion for invertebrates.

A chance encounter with an acquaintance led Noel Tait to find a career that actually paid him to follow his passion for natural history. Noel went on to become one of the founding members of academic staff at the newly-formed Macquarie University and for almost forty years he introduced hundreds of undergraduate students to the wonders of the invertebrate world. With colleagues and graduate students he carved out a fascinating research path studying the enigmatic peripatus, commonly known as velvet worms. Noel was the first to witness peripatus using head structures during mating and his team were responsible for the discovery of over 70 new species of onychophorans, the group that includes all peripatus. In retirement Noel now focuses on his passion for education outreach by taking good quality microscopes and specimens of invertebrates to primary schools, and writing books on natural history for young naturalists. We catch up with Noel to hear about joys of a career spent doing one's hobby.

What inspired you to do biology?

I was a natural historian from birth, I lived at Coogee and spent my time on the rock platform with my dog exploring life in the rock pools. But biology was not taught at my school so I had no idea that there was a subject called Zoology at University. I had left school without a clue of what I could or should do with myself so I went to Sydney Technical College at Ultimo to do industrial chemistry at night and worked at the British Motor Corporation in Zetland by day. I thought that my life was over.

Then I met a friend of my eldest brother who said to me "Thank God I don't have to continue that subject Zoology". When I asked him what Zoology entailed, he said that it was about cutting up earthworms, snails, cockroaches, dogfish, cane toads and rats. "Perfect", I thought.

So I left my job the next afternoon feigning illness and took myself to the University of Sydney where I found the Zoology Department on Science Road. I had never stepped inside a university before, but from that first moment, I knew that it was the place for me. I quit my job and enrolled in a BSc. I had no idea that I could combine my passion for natural history with a job that paid me to do just that.

How did you discover the unusual ***Florelliceps stutchburyae*****?**

While sampling quadrats of leaf litter in the Nightcap Ranges, I discovered a new species of peripatus that was confined to the leaf litter and that had a strange structure on its head. Among the specimens of this new species, I caught two individuals who were in the act of copulation! The male was holding a bundle of sperm in his head structure, which he had everted into the female's vagina. She, in turn, was holding onto his head with her 15th pair of thighs. From this pair of worms, I unravelled the mystery of the head structures in males: they use it to transfer sperm to the female's vagina in a most unusual way. This mating strategy is unique to Australian peripatus.

What have been the highlights of your career?

Research on onychophorans, especially the Australian species, has had a renaissance since 1985. During this time, onychophoran studies have been at the centre of some major changes in thinking that have had huge implications for biological theory. For example, we have re-evaluated relationships among animal phyla, showing that velvet worms are at the beginnings of the evolution and diversification of the Arthropoda. At the finer scale, our research on population genetics and phylogeography has thrown light on aspects of the origin of species.

Then there is our work elucidating the basic biology of velvet worms, in particular their bizarre diversity in male and female reproductive strategies.

Why have you devoted yourself to outreach education in your retirement?

I feel as though I have gone full circle back to my childhood, but this time I want there to be encouragement for kids to engage in observation of the natural world. I want to nurture the next generation of natural historians and perhaps the odd career biologist as well. It would make me enormously satisfied if someone from a past workshop confessed: "I was inspired to become a research biologist after this enthusiastic, kooky-looking guy came to our primary school and showed us how to use a microscope and then let us look at the details of some amazing little critters."

WARRAH FIELD DAY, 22 OCTOBER, 2011

BY MIKE THOMPSON

Around 100 people attended the first ever alumni function at our field station at Pearl Beach, Warrah.

The weather was perfect as alumni from the 70s, 80s, 90s and 00s gathered to reminisce and for many of them to share their experiences of Warrah with their families. There were activities for all ages, with Fran van den Berg guiding the offspring of many alumni through a treasure trove of biological specimens in the lab while their parents could sit, talk and enjoy the environment.

Ross Coleman led a walk along the rock platform as the caterers cooked the BBQ lunch. We were visited by the usual range of magpies, kookaburras, crows, brush turkeys, currawongs and butcherbirds, although surprisingly, we only lost one sausage to the birds. The goanna did not make an appearance.

After lunch, Ben Oldroyd and Trevor Wilson led walking tours up the track to the lookout, while some people preferred to take their own walks in other directions. Of course, Ben stopped to point out a honey beehive high in a tree, and that led us to observe a rare swarm of native bees nearby. Many people didn't want to leave, but we all packed up late in the afternoon, a couple of hours after our scheduled end, to leave Warrah once again to the birds.

Many people helped make the day a success, including Carla Avolio, Ross, Ben, Fran and Trevor for leading activities, and many current postgraduate students, Madeleine Beekman and others for helping on the day. The success means that we will do something similar again in the future, but not next year. 2012 marks the 50th anniversary of the approval to form the School of Biological Sciences, which then came into existence on 1 January 1963. We are planning a number of events to mark the occasion, and we will inform you of these activities as they roll out.

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