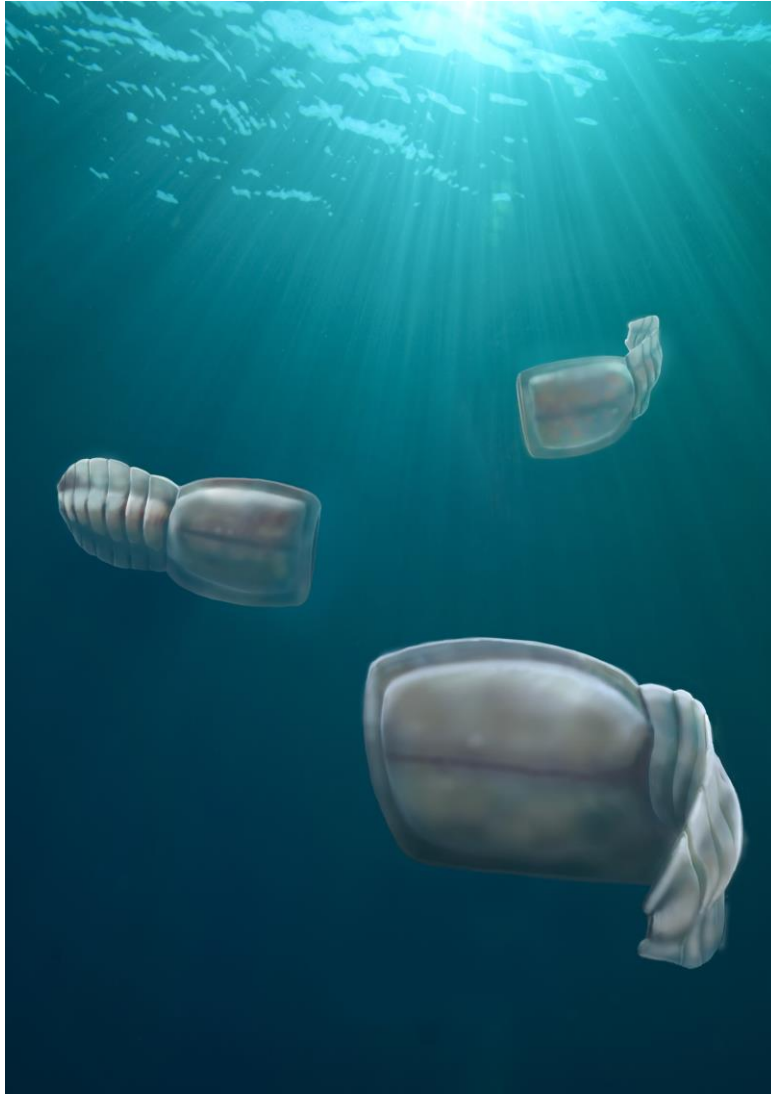


N O M E N



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Executive & Office Bearers 2014-2016

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Editor, *Nomen nudum*: Dr Ian Percival, Geological Survey of NSW, Sydney

Nomen nudum is the annual newsletter of the Association of Australasian Palaeontologists (AAP), a specialist group within Geological Society of Australia, Inc. *Nomen nudum* is supplied as a service to members of AAP, and is available on the AAP website. *Nomen nudum* is published to acquaint members with the activities of palaeontological colleagues and with any other items of current interest. Enquiries and contributions should be directed to the editor (contact details above).

Membership of AAP (including personal subscription to the Association's peer-reviewed international palaeontological journal *Alcheringa*), is available to all palaeontologists (professional, amateur, active and retired), particularly – but certainly not restricted to – those with interests in fossils of Australia, New Zealand, and Papua New Guinea. Details of membership requirements, categories and fees are available from the Geological Society of Australia website, which also has information regarding titles and prices of the *AAP Memoirs* series (46 volumes published since 1983). Library subscriptions to *Alcheringa* should be addressed to Taylor & Francis (www.tandf.co.uk/alcheringa).

Opinions expressed in this newsletter are those of individual contributors and do not necessarily reflect the views of the Association of Australasian Palaeontologists nor the Geological Society of Australia, Inc. Mention of a product or service should not be construed as constituting endorsement by either organisation.

Front cover: Reconstruction of the vetulicolian *Nesonektris aldrigei*, from the Emu Bay Shale (lower Cambrian), Kangaroo Island, South Australia. Illustration courtesy of the artist, Katrina Kenny copyright 2014.

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CHAIRMAN'S MESSAGE

With the scheduled biennial transition of the AAP Executive to South Australia, I've been tapped on the shoulder to take up the exalted position of Chairman. Diego Garcia-Bellido and Trevor Worthy complete a lean and mean triumvirate as secretary and treasurer respectively. Barring palace coups, you're stuck with us until mid-2016.

Thanks to the meritorious toils of previous Chairman Gregory Webb, who did much heavy lifting in relation to the recently adopted GSA constitution and its impact on AAP, the new Executive can commence in clear air. Thank you, Gregg!

I must also sincerely thank our ongoing publications editors Stephen McLoughlin (*Alcheringa*, assisted by Benjamin Kear), John Laurie (overseeing the AAP Memoir series with support of guest editors), and Ian Percival (*Nomen nudum*) who steer our publications through to the light of day. Thank you all for your hard work.

It's been a fair while since AAP last held a comprehensive conference. So the major initiative during our reign will be **Palaeo Down Under 2**, an all-AAP conference in Adelaide, South Australia, scheduled for early July 2016. This will take place just after the Geological Society of Australia (GSA)'s regular biennial Australian Earth Sciences Convention (AESC), also being held in Adelaide, from 26-30 June. We hope there will be synergies arising from this timing. As well as drawing together a goodly number of AAP colleagues from Australia and New Zealand, we plan to make Palaeo Down Under 2 a multinational conference with the involvement of the International Subcommission on Ediacaran Stratigraphy (ISES), the International Subcommission on Cambrian Stratigraphy (ISCS) and perhaps other such organisations. While planning has only just begun, we envisage around five days of talks, with pre- and post-conference field trips to such places as the Flinders Ranges, Kangaroo Island, Narracoorte Caves, the Murray Basin and perhaps further afield. We want this conference to cater for invertebrate and vertebrate, microbe and plant researchers, from Ediacaran (or earlier) to the present – that is, everyone. Suggestions for potential invitee organisations or field trips will be welcome. Please keep July 2016 free for this auspicious event.

Pierre Kruse

South Australian Museum, Adelaide

ANNOUNCEMENT – ESTABLISHMENT OF AAP MEDAL AND EARLY CAREER PRIZE

The new AAP Executive Committee has resolved to institute the biennial award of an AAP medal and early career prize. These prospective awards have been discussed within AAP for many years, and the Executive Committee considers that it is high time we introduced these public acknowledgements of palaeontological excellence.

The AAP medal will be awarded on the basis of lifetime contributions to Australasian palaeontology.

The early career prize will be awarded for the best paper(s) published in the previous two years in a peer-reviewed AAP publication by an early career researcher as first author. 'Early career' is defined as any tertiary student, or any researcher who has graduated less than five years previously at the time of submission of the paper.

Provided authors meet the above criteria, publications by any Australasian, or by any researcher that deal with material from the Australasian region, will be eligible for consideration.

I hereby call for suggestions from any and all Australian and New Zealand palaeontologists (you do not have to be an AAP member) for suitable names to identify these awards. Names of well known Australasian palaeontologists are of course suitable, particularly if their work spanned several fossil groups, geological time intervals, states, islands and/or countries within the Australasian region. In such cases, I ask the proposer(s) to check that the name of the person is not already attached to any other medal, prize or other instrument, so that there can be no confusion with our awards. (For example, Edgeworth David could be nominated, except that there is already an Edgeworth David Prize awarded to palaeontology students at the University of Sydney). Other derivations for names will also be considered.

So please, send in your nominations to me as soon as you can.

Pierre Kruse
AAP Chair

***Alcheringa* report**

There have been no changes to the editorial board or publication format of *Alcheringa* in 2014. *Alcheringa* is published by the Association of Australasian Palaeontologists through a 5-year renewable contract with Taylor & Francis. The contract was last renewed in 2011 (and will be up for renewal around the time of the next editorial hand-over in mid-2016).

Alcheringa currently publishes four issues per year. The journal is managed primarily by the Honorary Editor, with help from the Assistant Editor, and occasionally from members of the editorial board of 19 specialist palaeontologists.

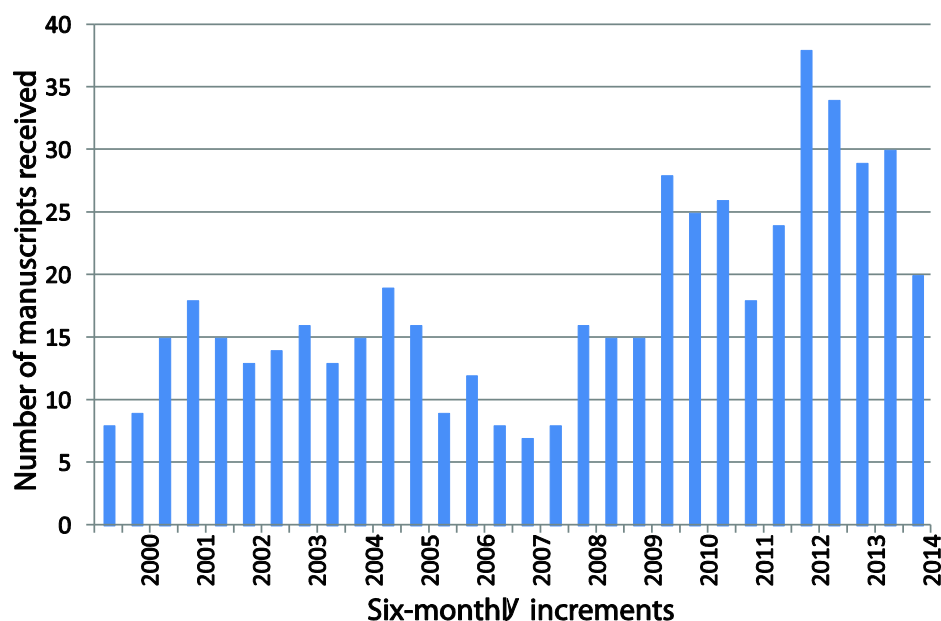
All manuscripts are submitted electronically through the journal's ScholarOne Manuscripts portal (<http://mc.manuscriptcentral.com/talc>), and this system sends out automated reminder emails to authors, reviewers, and editors regarding deadlines. Manuscripts are reviewed by at least two experts in the field, with reviews being submitted through the ScholarOne portal. Detailed editing of manuscripts is undertaken at the review stage and at revision stage. Edited and accepted manuscripts are submitted electronically via CATS (Central Article Tracking System) to Taylor & Francis then forwarded to the typesetters for proof production (some additional technical editing is done at this stage). Usually, two sets of proofs are checked by the editor (one set only by the authors) before uploading pdf pre-prints to the journal's website, prior to print publication.

Alcheringa's impact factor for 2013 was 0.899 (see table below), ranking 35 out of 49 in the Palaeontology serials list. We hope to see these metrics improve in coming years.

JCR Data						<i>Eigenfactor</i> ® Metrics	
Total Cites	Impact Factor	5-Year Impact Factor	Immediacy Index	Articles	Cited Half-life	<i>Eigenfactor</i> ® Score	Article Influence® Score
522	0.899	0.956	0.260	50	>10.0	0.00082	0.309

Alcheringa continues to be bundled with Taylor & Francis' science and agriculture journals when marketed to institutions.

The relatively high numbers of manuscripts submitted to the journal in the past few years has necessitated slight increases in the page budget. The 2014 page budget is 152 pages per issue (608 pages per year). Since the number of manuscripts received has broadly stabilized at around 20–30 per 6 months (see figure below), we do not envisage a need to increase the page budget within the next two years.



Number of manuscripts received (Y axis) per 6-month interval since mid-1999 (X axis).

Geography of articles.

We continue to receive a large proportion of our manuscripts from Australian, Chinese and Argentinean authors.

For 2014, First authors of papers were based in the following countries:

Australia	13 papers
China	10
Argentina	6
Brazil	2
UK	2
Sweden	2
New Zealand	1
USA	1
Poland	1
Netherlands	1
Czech Republic	1
Germany	1
France	1

2014 papers were based primarily on fossil material from these countries:

Australia	15 papers
China	10
Argentina	5
New Zealand	3
France	2
Brazil	2
Greenland	1
USA	1
Kazakhstan	1
Indonesia	1
Chile	1

For 2014, papers were published on the following major groups:

Vertebrates	14 papers
Invertebrates	24
Plants/palynomorphs	3
Other	1

2014 papers were published on fossils from the following geological intervals:

Quaternary	2
Neogene	6
Paleogene	5
Cretaceous	7
Jurassic	7
Triassic	0
Permian	4
Carboniferous	2
Devonian	1
Silurian	1
Ordovician	4
Cambrian	3

The proportions of initial decisions on papers for the journal are as follows:

Rejection	18%
Reject and resubmit	8%
Major revision	43%
Minor revision	33%
Withdrawn before decision	1%

At present, the journal is running smoothly and there are no major issues to deal with. However, maintaining a high and consistent level of editorial attention to the journal does require a significant commitment of work time. Although the editorial team can manage this level of commitment at the moment, a change in the editorial team in 2016 or changes of individuals' circumstances may mean that the Association will need to take on additional assistant editors at that time.

Dr Stephen McLoughlin
Honorary Editor

AAP MEMOIRS

John Laurie reports that two volumes of AAP Memoirs were published in 2014.

Laurie, J.R., Paterson, J.R. & Brock, G.A. (eds), 2014. Cambro-Ordovician Studies V. *Memoirs of the Association of Australasian Palaeontologists* 45, 419 p.

Contents

- New Zealand Cambrian and Ordovician micromolluscs, by *John Pojeta Jr, John E. Simes & Roger A. Cooper*
- Late Furongian trilobites from the Quebrada Oblicua, San Isidro area, Mendoza, Argentina, by *M. Franco Tortello*
- Northern Australian microbial-metazoan reefs after the mid-Cambrian mass extinction, by *Peter D. Kruse & Joachim R. Reitner*
- Furongian (late Cambrian) brachiopods and associated conodonts from the Takaka Terrane in the Springs Junction - Maruia area, South Island, New Zealand, by *Ian G. Percival, Yong Yi Zhen, John E. Simes & Roger A. Cooper*
- Exceptional trace fossil preservation and mixed layer development in Cambro-Ordovician siliciclastic strata, by *Lidya G. Tarhan, Mary L. Droser & Nigel C. Hughes*
- The mid Cambrian (Guzhangian; Marjuman) trilobite genus *Catillicephala* Raymond 1938 (Catillicephalidae) from the Cow Head Group and correlatives in eastern Canada, by *Stephen R. Westrop & Alyce A. Dengler*
- The missisquoiid trilobite *Parakoldinioidia* Endo 1937 in the uppermost Cambrian of Oklahoma and Texas, and its biostratigraphic significance, by *Stephen R. Westrop & Jonathan M. Adrain*
- The early evolution of Middle-Late Ordovician rhynchonellide brachiopods in Laurentia, by *Colin D. Sproat, Akbar Sohrabi & Jisuo Jin*
- Trilobite biostratigraphy of the Stairsian Stage (upper Tremadocian) of the Ibexian Series, Lower Ordovician, western United States, by *Jonathan M. Adrain, Stephen R. Westrop, Talia S. Karim & Ed Landing*
- The Early Ordovician (late Tremadocian; Stairsian) dimeropygid trilobite *Pseudohystericurus* Ross, by *Jonathan M. Adrain, Talia S. Karim & Stephen R. Westrop*
- New bradoriid arthropods from the Giles Creek Dolostone (Cambrian Series 3, Stage 5; Templetonian), Amadeus Basin, central Australia, by *Patrick M. Smith, Glenn A. Brock, John R. Paterson & Timothy P. Topper*
- Brachiopods associated with stromatoporoid mounds from the Middle to Upper Ordovician Cashions Creek Limestone, Tasmania, by *Kristian G. Jakobsen, Glenn A. Brock, Arne T. Nielsen, David K. Mathieson & David A. T. Harper*
- A Cambrian Series 3 (Guzhangian) trilobite fauna with *Centropleura* from Christmas Hills, northwestern Tasmania, by *Christopher J. Bentley & James B. Jago*
- Middle Cambrian (Series 3) arthropods (Trilobita, Agnostida) from CRA Exploration Scarr 1 drillhole, central Georgina Basin, Northern Territory, by *John R. Laurie*
- The Early Ordovician (Floian) bathyurid trilobite genera *Jeffersonia*, *Cullisonia* and *Bathyurina*, by *Jonathan M. Adrain, Talia S. Karim & Stephen R. Westrop*
- Middle Cambrian brachiopods from the southern Georgina Basin of central Australia, by *Ian G. Percival & Peter D. Kruse*
- The early middle Cambrian agnostid *Pentagnostus praecurrens* (Westergård 1936) from Sweden, by *Thomas Weidner & Jan Ove Ebbestad*

Zhou Zhiyi, Yin Gongzheng & Zhou Zhiqiang, 2014. Ordovician (Darriwilian-early Katian) trilobite faunas of northwestern Tarim, Xinjiang, China. *Memoirs of the Association of Australasian Palaeontologists* 46, 1-142.

Abstract

Seventy-one late Middle and Late Ordovician trilobite species belonging to 50 genera and subgenera, 24 families and 7 orders are described from northwestern Tarim, Xinjiang. Of these, 18 species and 2 genera (the nileid *Paraperaspis* and lichid *Tairongia*) are new. Much new morphological information is provided and ranges of variation are revealed for previously known forms on the basis of the new material. Ten trilobite biofacies developed during the Darriwilian–early Katian in relation to environmental gradients of the platform margin, shallow outer-shelf basin and outer-shelf slope are reviewed herein, taking account of the newly described and revised trilobite faunas. Eustatic changes that took place in the region, including a latest Darriwilian–Sandbian transgression and an early Katian regression, are suggested by the shoreward or seaward shifts and the vertical replacements of trilobite associations. Trilobites exhibit close biogeographic connections with the coeval faunas recorded in other terranes of peri-Gondwana, especially in South China, North China and Central Asia. The occurrence of some early Darriwilian genera that were previously considered as typical of either Laurentian (e.g. *Nanillaenus*, *Kawina* and *Xystocrania*) or the Baltoscandian (*Parillaenus*, *Panderia* and *Hemisphaerocoryphe*) faunas indicate that faunal exchanges between peri-Gondwana, Laurentia and Baltoscandia may have begun much earlier than the late Katian when the Ordovician faunal provinces finally broke down.

Both volumes are obtainable from:

Geological Society of Australia Incorporated
Suite 61, 104 Bathurst St
Sydney NSW 2000 Australia
Telephone: (02) 9290 2194
E-mail: info@gsa.org.au
Homepage: <http://www.gsa.org.au>

STATE and TERRITORY FOSSIL EMBLEMS

Presently, Western Australia is the only state or territory in Australia to have an officially designated fossil emblem: *Mcnamaraspis kaprios* from the Devonian Gogo fish fauna.

To raise the profile of palaeontology in the public awareness, each state and territory in Australia should follow the WA lead and formally adopt a fossil emblem. Ideally each symbol would be characteristic of, or unique to, that state or territory, would be iconic and easily recognisable, and would capture the public's imagination (so perhaps a microfossil or trace fossil would be inappropriate). Suggestions could be sought from the public as well as palaeontologists in museums, universities and geological surveys, with the final decision to be made by a committee of local palaeontologists who would present their selection to the Minister responsible for Mineral Resources (or equivalent department). The following list, while not conclusive, could act as a starting point for such suggestions:

NSW: *Mandageria*, the largest genus of the Late Devonian Canowindra fish fauna;
Victoria: *Baragwanathia*, one of the earliest land plants of late Silurian age from Yea;
Tasmania: Lune River pteridophyte fern of latest Early Jurassic age;
South Australia: *Spriggina*, from the Neoproterozoic Ediacara fauna;
Queensland: *Muttaburrasaurus*, a Cretaceous dinosaur found only in that state;
NT: the Dromornithid, a large flightless bird from the middle to late Miocene.

The above is very slightly modified from a paper I had published in early 2014 in *Geoheritage*, which was mainly concerned with protection and preservation of Australia's palaeontological heritage. Since then, there has been a concerted effort made to have *Mandageria fairfaxi* declared the NSW state fossil emblem. At the time of distribution of this issue of *Nomen nudum*, I understand that an official announcement regarding this proposal may not be too far off. Furthermore, plans are well advanced in South Australia to also formally select a fossil emblem for that state. Palaeontologists in the other states and the Northern Territory are asked to follow the lead of WA, NSW & SA and initiate the process leading to selection of an appropriate fossil emblem. Our colleagues in New Zealand might also take up this suggestion, with promotion of a national fossil symbol.

Ian Percival
Nomen nudum editor

GEOHERITAGE and CONSERVATION OF PALAEONTOLOGICAL SITES

The protection and preservation of palaeontological sites that are threatened by a range of issues including development, collecting pressures (including outright theft of important specimens) and mining or quarrying activities, is of increasing concern. This year localities in three states have been the subject of campaigns involving government enquiries and public petitions. One of these, the Ajax Limestone archaeocyathid reef in South Australia, is now afforded enhanced protection after a protracted fight by Pierre Kruse to list the site on the state heritage register, so saving it from potential destruction by exploration associated with the adjacent minesite.

In central NSW, the significant Ordovician palaeontological sites of Fossil Hill and Trilobite Hill and adjacent localities, are under threat of inundation should a dam be built at the Needles Gap on the Belubula River. The famous Cliefden Caves, containing scientifically significant helictites and other speleothems, would also be entirely flooded, as well as considerable swathes of prime agricultural land in the river valley upstream from the dam. Currently, the Needles damsite and several other options are being investigated by a state government feasibility study. Many palaeontologists have already signed a petition [see www.savecliefdencaves.org] against the proposal. If you haven't added your name there, please consider doing so.

On Port Philip Bay southeast of Melbourne, a Cainozoic vertebrate, invertebrate and ichnofossil site in the Beaumaris Sandstone, considered by John Buckeridge (RMIT) as the most significant of this age in Australia, faces destruction if a proposed development of the adjacent marina is allowed to proceed. Again, a petition has been launched to draw attention to the palaeontological importance of the site.

https://www.change.org/p/parliament-of-victoria-bayside-and-kingston-local-councils-reject-the-proposal-by-beaumaris-motor-yacht-squadron-for-a-marina-in-beaumaris-bay?recruiter=150087210&utm_source=share_petition&utm_medium=email&utm_campaign=share_email_responsive

Given the concern about ongoing and potential threats to several of our most significant palaeontological sites, the AAP Executive has determined to appoint a representative to the Standing Committee on Geoheritage (of the Geological Society of Australia) to ensure a coordinated and effective response.

BOOK REVIEW

Issues in Palaeobiology: a Global View

Interviews and Essays.

edited by Marcelo R. Sánchez-Villagra & Norman MacLeod

Scidinge Hall Verlag, Zürich 2014. 289p. ISBN: 978-3-905923-17-9

Price & availability: US\$18, from Amazon.com

Issues in Palaeobiology is an interesting and thought provoking book, published as a compilation of personal interviews and essays by 22 paleobiologists from around the globe. The book aims to discuss the fundamental questions – what is palaeobiology? Where is it going? How does it relate to classic palaeontology? What motivates people to become palaeobiologists? Editor Marcel R. Sánchez-Villagra expresses the desire “to examine and learn more about the geographic variation in the opinions and views that people hold” regarding “objects and subjects of palaeontology, and the relationship between its boundaries to those of other disciplines”. This is achieved by a series of revealing interviews, asking each participant five key questions:

- *What are the most important problems in palaeobiology?*
- *Which is the most fundamental issue of palaeobiology and evolution that your work addresses?*
- *How could continuation or an expansion of your research programme lead to new insights or open new questions in palaeobiology?*
- *What do you see as the most interesting criticism against your position in discussions about palaeobiology and evolution?*
- *Why were you initially drawn to research in palaeobiology?*

Finally Sánchez-Villagra wonders “what the future of the discipline will look like and even if it makes sense to talk of ‘palaeontology’ as a single, unified area of research”. Since the 1960’s, and in particular after discussion by S. J. Gould and contemporaries, the study of the biology of ancient life, or “biological palaeontology” now known as *palaeobiology*, has developed to become an influential and popular science, uniting geology and classical palaeontology with ecological and evolutionary biology. The subject tends to be associated with the more interpretative biological aspects of studying the fossil record, encompassing a suite of analytical techniques, from comparative anatomy and morphometrics, to cladistics and phylogenetics, the patterns and processes of macro-evolution. Although at times viewed as rather ‘fragmentary’ discipline, today with its’ own published journal, “Palaeobiology”, and significant advances in computational data analysis, the once obscure field within palaeontology has truly blossomed.

The interviews included in *Issues in Palaeobiology* offer personal and often unique insights into the thinking behind current research being undertaken by a diverse group of palaeobiologists working around the globe. Those selected to participate vary in their fields of expertise, both geographically, from Columbia (Jaramillo), to Finland (Jernvall) for example; and taxonomically, from foraminifera (BouDagher-Fadel), plants (Boyce, McElwain), to mammals (MacFadden, Janis) etc. Their individual responses to the same set of questions above evoke curiosity and comparison from the

reader. One notes the differences, but perhaps more obviously in this volume, the similarities.

To counter a perceived distancing of palaeobiology from its roots in geology and stratigraphy, some of the participating authors (eg. Korn, Lazarus) highlight the contribution made by classical palaeontology in providing the raw data about taxa through deep time, and evidence of extinct clades (from direct study of fossil specimens) as the foundation for any palaeobiological analysis. They emphasize the importance of integrating both geological and biological input, and stress that there is still much to be gained from applying and uniting biological techniques to wider areas across the field of palaeontology, such as the marrying of ontogenetic and molecular studies with taxonomy; and ecological/community studies with biogeography and biodiversity. Editor Sánchez-Villagra rightly remarks that the strength of palaeobiology “*lies in its diversity*”; by integration of approaches and dissolving the often self-imposed boundaries of subfields within palaeontology, or separate interest groups (with their own historical ‘labels’), we can work together to better achieve our aims.

The questions posed in *Issues in Palaeobiology* apply to all of us working or studying in the field of palaeontology, they stimulate thought, they provoke us to ask how we would respond and answer the interviewer ourselves. This helps us to consolidate our own views. In my case, I was fortunate to have attended University of Otago, where Ewan Fordyce taught a very detailed and inclusive course in all aspects of palaeontology. He managed to convey and weave together the strands of palaeobiology, from functional morphology to cladistics in a way that inspired students to feel part of a united journey of discovering the past, no matter what organism(s) they studied. Interestingly, and perhaps typically, each contributor to *Issues in Palaeobiology* reveals a similar characteristic enthusiasm and passion for their scientific field! Regardless of the many practical applications or variety of technological achievements across the discipline, at the end of the day, to quote Kevin Boyce: “it is endlessly rewarding to pick up a fossil and think about how the living thing could have worked”.

Being a New Zealander, of course I would have liked *Issues in Palaeobiology* to have had a representative kiwi palaeobiologist, but at least an Australian (Michael Lee) is included. Not your usual scientific text, the book itself is a handy paperback-sized volume for easy reading (and perhaps lower price); it is clearly presented, with no obvious typos. The editors have done a fine job with the formatting and the short biographies of the contributors will be greatly appreciated by curious readers. Only those interviewed will know whether the answers to questions are accurately recorded, but one does get the sense of each participant’s individual style and personality. In addition to the interviews, concluding essays are provided by editors Sánchez-Villagra and MacLeod, which further examine the issues and trends in palaeobiology, as influenced by Gould and others, and provoke us to ask how the subject itself might evolve in the future. The book will certainly appeal to students and researchers in palaeontology, less so the lay-person. Certainly, in terms of the history of science, the *Issues in Palaeobiology* interviews provide a unique and fascinating ‘snapshot’ of current thinking within our discipline c.2014.

Book review by Dr **Seabourne Rust**, Northland, New Zealand
seabourne.rust@gmail.com

OBITUARY

GABOR FOLDVARY 1931-2014

Gabor Zoltan Foldvary was born in Budapest, Hungary on February 7, 1931, to Dr Laszlo Foldvary, a forestry engineer, and his wife, Katalin. In December 1944, as the Soviet Russian armies encircled Budapest, the family fled at night and headed west, eventually reaching Bavaria, where Gabor resumed his education at a Hungarian high school in the Passau refugee camp. He also visited the famous fossil fields nearby and one of his collections from this time is now in the Australian Museum.

In 1950 the Foldvarks were given the opportunity to emigrate to Australia, first being housed in the Greta migrant camp and subsequently moving to Sydney, where Gabor worked in a tannery and completed his Leaving Certificate at night. In the late 1950s, Gabor started work as a laboratory attendant at the University of NSW, where he looked after the fossil collection, prepared thin sections of rocks for microscopy and did photomicrography. He also completed a Bachelor of Science degree part-time, graduating in 1966 with a geology major and biology second major.

That year he joined the Department of Geology and Geophysics at the University of Sydney as professional officer and curator of the fossil collections. He prepared a catalogue of the type specimens. Gabor also embarked on three years of independent research work in central NSW, constructing a geological map of the Trundle-Bogan Gate-Condobolin area, which formed part of his 1969 Masters thesis at UNSW. He published three papers documenting Siluro-Devonian fossils of this region.

Gabor returned to Hungary in 1969, for the 100th anniversary of the Hungarian Geological Institute. His second trip to Hungary, in 1975, was to gather the information for his book, *Geology of the Carpathian Region* (1988) which paved the way for geologists to understand this vast and tectonically complex area.

Gabor retired in 1991 but continued writing palaeontological papers and chapters in books. He edited the *Hungarian World Encyclopaedia* for its Canadian publisher and was actively involved with the Australian Museum as an honorary curator of their fossil collections. He was also a Research Affiliate at the University of Sydney.

Along with his academic work, Gabor was president of the Hungarian Historical Society for several years and regularly gave lectures and wrote articles for Hungarian and English publications. From 1980, he was a committee member of the Sydney Mozart Society and wrote program notes for concerts for some 12 years.

In later life, Gabor became interested in Buddhism and in 1998 travelled to Tibet.

Gabor Foldvary died in Sydney in 16 September 2014. He is survived by his wife Beryl (they had married in 1957), children Elizabeth, Lyndall, Marta and Malcolm, three grandchildren and siblings Madelaine and Laszlo.

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[thanks to John Talent for compiling a much more detailed obituary from which the above version is drawn, with input from Lyndall Foldvary]



17th International Bryozoology Conference “Bryozoa Downunder” 10-15 April 2016, Melbourne

The triennial conference of the International Bryozoology Association (IBA) will be held at Melbourne Museum, Victoria. The IBA Conference is a multidisciplinary meeting that covers palaeontology, morphology, phylogeny, geochemistry, taxonomy, ecology, development and genetics of the phylum Bryozoa and we encourage attendance from a wide range of disciplines (membership of the IBA is free, with donations encouraged).

Draft Program:

Pre-conference trip (Tasmania): 4-9 April led by Dr Catherine Reid; includes spectacular Permian bryozoan reefs on Maria Island

Workshops: 10 April; online databases for Bryozoa

Conference: 11-16 April

Post Conference Trip (Melbourne–Adelaide): 17-24 April led by Dr Rolf Schmidt; includes the Cainozoic limestone coast

Registration opens April 2015 (costs are estimated at this point):

Full registration: \$500

Accompanying member: \$300

Students & Retired members: \$200

Proceedings: The proceedings of the IBA Conference will be published as a peer-reviewed volume in the AAP Memoir series.

Contact Rolf Schmidt rschmid@museum.vic.gov.au for information and conference circulars, and to express interest in attending.

The official website for the conference will be live at: www.iba2016.org

The international conference on Early Vertebrates/Lower Vertebrates is being hosted in Melbourne, Australia, 3rd-7th August 2015. Registration is now open. Contact Kate (K.Trinajstic@curtin.edu.au) for more information.

RESEARCH REPORTS

Australian Capital Territory

Geoscience Australia, Canberra

John Laurie retired in May 2014 but now has an emeritus position at GA. John divides his time between working on the Cambrian biostratigraphy of the Georgina Basin and the Chemical Abrasion-Isotope Dilution Thermal Ionisation Mass Spectrometry (CA-IDTIMS) project calibrating the Permian and Triassic palynostratigraphy. The former project has seen the analysis of six sampled wells written up as ‘professional opinions’, while a short paper has been published and another on the Whitehouse specimens of *Redlichia* is in preparation. The latter project has seen an extended abstract published for which John was awarded best paper in the Sydney Basin Symposium at the recent AESC in Newcastle.

Because of his experience in editing, timescales and palaeontology, John also continues to have input into several other projects undertaken by GA (Acreage Release, Timescales, Education etc.). One of the products for the education group is a ‘teacher notes and student activities booklet’ on fossils which is nearing completion. Several other projects still under way include one on Late Cambrian trilobite faunas from southernmost Tasmania (with Jim Jago and Kim Bischoff). John also continues editing the AAP Memoirs. In the last 12 months, two volumes (No.45 - Cambro-Ordovician Studies V; No.46 - Tarim Basin Ordovician trilobites) have been published, while another on Jurassic palynology is nearing completion.

Edwards, D.S., Kelman, A.P., Kennard, J.M., Laurie, J.R., Lewis, B., Mantle, D.J. & Nicoll, R.S. 2014. *Chart 32, Bonaparte Basin Biozonation and Stratigraphy*, Geoscience Australia.

Laurie, J.R. 2014. Middle Cambrian arthropods (Trilobita, Agnostida) from CRA Exploration Scarr 1 drillhole, central Georgina Basin, Northern Territory. *Memoirs of the Association of Australasian Palaeontologists* **45**, 297-303.

Laurie, J.R., Bodorkos, S., Nicoll, R.S., Smith, T. & Crowley, J. 2014. Recalibrating the Permian palynostratigraphic scheme via U-Pb zircon CA-IDTIMS dating of tuffs in eastern Australian basins. Australian Earth Sciences Convention, Newcastle, July 7-10. *Geological Society of Australia, Abstracts* 110, 5 p.

Australian National University

Vincent Dupret is working on placoderms (fossil armoured fish from the Silurian and Devonian periods). The core of most of his studies is to scan fossils (either Synchrotron or CT), render in 3D their internal structures and interpret this in an evolutionary context. Vincent and his collaborators recent work included the proposal of an evolutionary scenario for the formation of the jawed vertebrate face. Vincent is continuing to work on aspects around the evolution of novel structures within early vertebrates; phylogenetic analyses and palaeobiogeography.

Dupret, V. 2010. Revision of the genus *Kujdanowiaspis* Stensiö, 1942 (Placodermi, Arthrodira, "Actinolepida") from the Lower Devonian of Podolia (Ukraine). *Geodiversitas* **32**, 5–63.

- Dupret, V., Carls, P., Martinez-Pérez, C. & Botella, H. 2011. First Perigondwanan record of actinolepids (Vertebrata: Placodermi: Arthrodira) from the Lochkovian (Early Devonian) of Spain and its palaeobiogeographic significance. *Palaeogeography, Palaeoclimatology, Palaeoecology* **310**, 273–282.
- Dupret, V., Phuong, T.-H., Thanh, T.-D., Phong, N.-D., Janvier, P. & Clément, G. 2011. The skull of *Hagiangella goujeti* Janvier, 2005, a high-crested acanthothoracid (Vertebrata, Placodermi) from the Lower Devonian of northern Vietnam. *Journal of Vertebrate Paleontology* **31**, 531–538.
- Dupret, V., Sanchez, S., Goujet, D., Tafforeau, P. & Ahlberg, P. 2010. Bone vascularization and growth in placoderms (Vertebrata): the example of the premedian plate of *Romundina stellina* Ørvig, 1975 *Comptes Rendus Palevol* **9**, 369–375.
- Dupret, V., Sanchez, S., Goujet, D., Tafforeau, P. & Ahlberg, P. 2014. A primitive placoderm sheds light on the origin of the jawed vertebrate face. *Nature* **507**, 500–503.
- Herbin, M., Dupret, V., Goussard, F. & Clément, G. 2010. 3D imagery techniques available for scientific improvement of anatomical collections. *Lettre de l'Office de Coopération et d'Information Muséographiques* **131**, 13–18.
- Martínez-Pérez, C., Dupret, V., Manzanares, E. & Botella, H. 2010. New data on the Lower Devonian chondrichthyan fauna from Celtiberia (Spain). *Journal of Vertebrate Paleontology* **30**, 1622–1627.
- Olive, S., Prestianni, C. & Dupret, V. 2015. A new species of *Groenlandaspis* Heintz, 1932, (Placodermi, Arthrodira) from the Famennian (Late Devonian) of Belgium. *Journal of Vertebrate Paleontology* **35**.
- Sanchez, S., Dupret, V., Tafforeau, P., Trinajstić, K., Ryll, B., Gouttenoire, P.-J., Wretman, L., Zylberberg, L., Peyrin, F. & Ahlberg, P. E. 2012. 3D Microstructural Architecture of Muscle Attachments in Extant and Fossil Vertebrates Revealed by Synchrotron Microtomography. *PLoS One*.
- Trinajstić, K., Sanchez, S., Dupret, V., Tafforeau, P., Long, J. A., Young, G. C., Senden, T., Boisvert, C., Power, N. & Ahlberg, P. E. 2013. Fossil Musculature of the Most Primitive Jawed Vertebrates. *Science* **341**, 160–164.

Des Strusz (Honorary Associate) continues work on a major project (with Ian Percival, Geological Survey of NSW) to describe Silurian brachiopods from Quidong in southern New South Wales. We anticipate that the main findings regarding faunal composition, biostratigraphic correlations and biogeographic affinities will be reported at the International Brachiopod Congress to be held in Nanjing in May, 2015. In the meantime, a multi-author paper (details below) has been published on Coppins Crossing ostracods, with its contained report of a single graptolite giving a definite Wenlock (*dubius* to *lundgreni* zones) age for the Canberra Formation. It's available from Taylor & Francis until my 50 downloads are exhausted -- using <http://www.tandfonline.com/eprint/GKaZVEVXCRTYqAZ9hffv/full>

Perrier, V., Siveter, D.J., Williams, M., Strusz, D.L., Steeman, T., Verniers, J. & Vandenbroucke, T.R.A. 2014. Myodocope ostracods from the Silurian of Australia. *Journal of Systematic Palaeontology*. DOI:10.1080/14772019.2014.948506

New South Wales

University of New England, Armidale School of Environmental and Rural Science

Alan Baxter is a Lecturer at the University of New England. His main research focus is the application of biostratigraphical and sedimentological constraints to ancient and modern convergent margins. Alan's current research is focused on the biostratigraphy of the Cocos Plate, using nannofossil samples he collected as a member of the IODP Expedition 344: Costa Rica Seismogenesis (A2) scientific team. Other areas of research include the sedimentology and biostratigraphy of the New England and Himalayan orogenic systems. Alan is interested to hear from any other microfossil researchers in Australia about potential projects, or from students who are interested in HDR opportunities in tectonics, biostratigraphy and sedimentology. His e-mail address is: alan.baxter@une.edu.au. In January 2015, Alan will sail on IODP Expedition 354: Bengal Fan as a nannofossil biostratigrapher.

Expedition 344 Scientists 2013. Costa Rica Seismogenesis Project, Program A Stage 2 (CRISP-A2): Sampling and quantifying lithologic inputs and fluid inputs and outputs of the seismogenic zone. *IODP Preliminary Report* **344**.
doi:10.2204/iodp.pr.344.2013.

Phil Bell continues his work on Cretaceous dinosaur faunas from western Canada and Australia. He helped found the Northern Alberta Dinosaur Research Group and in August co-led their first expedition to west-central Alberta, Canada in search of dinosaur and other vertebrate remains. Amongst other publications, he contributed two chapters to an edited volume entitled *The Hadrosaurs*, the definitive book on the so-called "duck-billed" dinosaurs, which will be released in December 2014.

Eberth, D.A. & Bell, P.R. In press. Stratigraphy of the Danek Bonebed (Upper Cretaceous Horseshoe Canyon Formation, central Alberta) and correlations with strata in the Drumheller and Grande Prairie regions. *Canadian Journal of Earth Sciences*.

Bell, P.R. & Currie, P.J. In press. *Albertosaurus* (Dinosauria: Theropoda) material from an *Edmontosaurus* bonebed (Horseshoe Canyon Formation) near Edmonton; clarification of palaeogeographic distribution. *Canadian Journal of Earth Sciences*.

Bell, P.R. & Campione, N.E. In press. Taphonomy of the Danek Bonebed: a monodominant *Edmontosaurus* (Hadrosauridae) bonebed from the Horseshoe Canyon Formation, Alberta. *Canadian Journal of Earth Sciences*.

Bell, P.R., Sissons, R., Burns, M.E., Fanti, F. & Currie, P.J. In press. New hadrosaurine material from the upper Campanian Wapiti Formation, west-central Alberta. In D.A. Eberth and D.C. Evans (eds.) *The Hadrosaurs: Proceedings of the International Hadrosaur Symposium*. Indiana University Press, Bloomington and Indianapolis.

Bell, P.R. In press. A review of hadrosaurid skin impressions. In D.A. Eberth and D.C. Evans (eds.) *The Hadrosaurs: Proceedings of the International Hadrosaur Symposium*. Indiana University Press, Bloomington and Indianapolis.

- Bell, P.R., Currie, P.J. & Russell, D.A. 2015. Large caenagnathids (Dinosauria, Oviraptorosauria) from the uppermost Cretaceous of western Canada. *Cretaceous Research* **52**, 101–107.
- Bourke, J.M., Ruger Porter, W.M., Ridgely, R.C., Lyson, T.R., Schachner, E.R., Bell, P.R. & Witmer, L.M. 2014. Breathing Life into Dinosaurs: Tackling Challenges of Soft-Tissue Restoration and Nasal Airflow in Extinct Species. *Anatomical Record* **297**, 2148–2186.
- Prieto-Marquez, A., Wagner, J.R., Bell, P.R. & Chiappe, L.M. 2014. The late-surviving ‘duck-billed’ dinosaur *Augustynolophus* from the upper Maastrichtian of western North America and crest evolution in Saurolophini. *Geological Magazine* doi:10.1017/S0016756814000284.
- Vavrek, M.J., Murray, A.M. & Bell, P.R. 2014. An early Late Cretaceous (Cenomanian) sturgeon (Acipenseriformes) from the Dunvegan Formation, northwestern Alberta, Canada. *Canadian Journal of Earth Sciences* **51**, 677–681.
- Bell, P.R., Fanti, F., Currie, P.J. & Arbour, V.M. 2014. A mummified duck-billed dinosaur with a soft-tissue cock’s comb. *Current Biology* **24**, 1–6.
- Bell, P.R., Fanti, F., Mitchell, M.T. & Currie, P.J. 2014. Marine reptiles (Plesiosauria and Mosasauridae) from the Puskwaskau Formation (Santonian–Campanian), west-central Alberta. *Journal of Paleontology* **88**, 187–194.

John Cook is a graduate student investigating the biomechanics of Sthenurines under the supervision of Associate Professor Stephen Wroe. His primary interest is to determine if the largest kangaroo in the fossil record, *Procoptodon goliath*, was capable of hopping. He is using computer modelling including Finite Element Analysis to study stress distribution of the hindlimbs across the macropodoid superfamily to determine the primary locomotion of sthenurines. Dynamic analysis of the musculoskeletal systems is also being used to determine a probable style of locomotion for sthenurines, as well as gait and average speed.

Luca Fiorenza continues to work on dietary reconstructions of extinct hominin species by looking at dental macrowear through the use of a sophisticated 3D digital approach, called Occlusal Fingerprint Analysis. He has recently published a very comprehensive review on Neanderthal ecology with the collaboration of international experts in the field of palaeobotany, zooarchaeology, biomechanics and stable isotope analysis. He is now working on developing a new method that combine Finite Element Analysis with dental macrowear. The aim is to investigate the relationship between physical properties of food, tooth morphology and masticatory cycle in living and extinct non-human primates.

- Fiorenza L., Benazzi S., Henry A., Salazar-García DC., Blasco R., Picin A., Wroe S. & Kullmer, O. 2014. To meat or not to meat? New perspectives on Neanderthal ecology. *Yearbook of Physical Anthropology*. DOI: 10.1002/ajpa.22659.
- Fiorenza L. 2014. Reconstructing diet and behaviour of Neanderthals from Central Italy through dental macrowear analysis. *Journal of Anthropological Sciences* **93**. DOI 10.4436/JASS.93002.
- Fiorenza L., Benazzi S., Moggi-Cecchi J., Menter C.G. & Ottmar, K. 2014. Dental macrowear analysis in Great Apes. *American Journal of Physical Anthropology* **153** (Issue S58), 117-118.

Lee Ann Hally is nearing completion of her PhD studies on middle Cambrian (Series 3) trilobites and agnostids of Australia.

Hally, L.A. & Paterson, J.R. 2014. Biodiversity, biofacies and biogeography of middle Cambrian (Series 3) arthropods (Trilobita and Agnostida) on the East Gondwana margin. *Gondwana Research* **26**(2), 654-674.

Ada Klinkhamer is a PhD student working on the limb biomechanics of sauropods under the supervision of Associate Professor Stephen Wroe from the University of New England and Dr Stephen Poropat from the University of Uppsala, Sweden. She is also collaborating with the Australian Age of Dinosaurs Museum in Winton Queensland. Her project aims to investigate questions relating to weight distribution and locomotion in sauropods through utilising 3D digital techniques.

Ian Metcalfe continues his work on conodonts in SE Asia (Malaysia, Thailand, Burma, Indonesia), China and Australia, including taxonomy, biostratigraphy, biogeography, colour and textural alteration and oxygen isotopes. A major project dating volcanic ashes (using high-precision U-Pb zircon CA-IDTIMS) in Australia (in collaboration with Boise State University, USA), partly aimed at international calibration of endemic biozonal schemes of the Permian-Early Triassic in Australia, continues. A first major paper is now in press with *Gondwana Research* in which it is demonstrated that the *Protohaploxyipinus microcorpus* palynology zone is temporally synchronous across Australia and is late Changhsingian in age. Work on Palaeozoic and Mesozoic biostratigraphy and biogeography in SE Asia in relation to the tectonic evolution of Asia and Tethyan ocean basins (including studies of radiolarians) continues and a major collaborative paper on evolutionary hotspots in SE Asia was published in 2014. Studies of Permian and Triassic conodonts in Pahang, Peninsular Malaysia have allowed the precise recognition of the Permian-Triassic boundary level in Malaysia and CA-IDTIMS dating of tuffs in conodont-bearing limestones in the late Changhsingian in Pahang are providing useful timescale calibration tie points. Results of this work are currently being prepared for publication. Studies of core material from the Perth Basin, Western Australia, which span the late Permian mass extinction and Permian-Triassic boundary level are being undertaken, including macro- and micro-fossils, magnetostratigraphy and stable carbon isotope stratigraphy. Biostratigraphy, chemostratigraphy and biomarker studies of the Induan-Olenekian boundary in the Perth Basin, WA also continue in collaboration with Curtin University.

Aung, K.P., Owens, R & Metcalfe, I. 2014. New Evidence for Carboniferous Age of the Taungnyo Group Exposed in the Loikaw Area, Kayah State. In: Win Swe, Soe Thura Tun, Myo Thant & Khin Zaw (Eds) Thirteenth Regional Congress on Geology, Mineral and Energy Resources of Southeast Asia GEOSEA 2014, Abstracts, 34-35.

de Bruyn, M., Stelbrink, B., Morley, R.J., Hall, R., Carvalho, G.R., Cannon, C.H., van den Bergh, G., Meijaard, E., Metcalfe, I., Boitani, L., Maiorano, L., Shoup, R. & von Rintelen, T. 2014. Borneo and Indochina are Major Evolutionary Hotspots for Southeast Asian Biodiversity. *Systematic Biology* **63**(6), 879–901.
doi:10.1093/sysbio/syu047

- Metcalfe, I., Crowley, J.L., Nicoll, R.S. & Schmitz, M. (in press) High-precision U-Pb CA-TIMS calibration of Middle Permian to Lower Triassic sequences, mass extinction and extreme climate-change in eastern Australian Gondwana. *Gondwana Research*. doi: 10.1016/j.gr.2014.09.002.
- Metcalfe, I. & Kyi Pyar Aung. 2014. Late Tournaisian conodonts from the Taungnyo Group near Loi Kaw, Myanmar (Burma): Implications for Shan Plateau stratigraphy and evolution of the Gondwana-derived Sibumasu Terrane. *Gondwana Research* **26**, 1159–1172. doi:10.1016/j.gr.2013.09.004.

John Paterson continues to work on Cambrian biotas from Australia and overseas. Research and excavations of the early Cambrian Emu Bay Shale Konservat-Lagerstätte carries on (Paterson et al. 2014; García-Bellido et al. 2014), with several manuscripts in preparation. New and ongoing projects include: early Cambrian shelly faunas from the Arrowie Basin (Flinders Ranges, South Australia); middle Cambrian trilobites from the Amadeus Basin (Northern Territory); exceptionally preserved fossils from the early Cambrian Guanshan Biota (with colleagues from Northwest University, Xi'an, China); and a large scale phylogenetic analysis of Cambrian trilobites (using new Bayesian techniques) to determine their origin and morphological evolutionary rates.

- García-Bellido, D.C., Lee, M.S.Y., Edgecombe, G.D., Jago, J.B., Gehling, J.G. & Paterson, J.R. 2014. A new vetulicolian from Australia and its bearing on the chordate affinities of an enigmatic Cambrian group. *BMC Evolutionary Biology*, **14**: 214, <http://www.biomedcentral.com/1471-2148/14/214>.
- Hally, L.A. & Paterson, J.R. 2014. Biodiversity, biofacies and biogeography of middle Cambrian (Series 3) arthropods (Trilobita and Agnostida) on the East Gondwana margin. *Gondwana Research* **26**(2), 654–674.
- Jacquet, S.M., Brock, G.A. & Paterson, J.R. 2014. New data on *Oikozetetes* (Mollusca: Halkieriidae) from the lower Cambrian of South Australia. *Journal of Paleontology* **88**(5), 1072–1084.
- Laurie, J.R., Paterson, J.R. & Brock, G.A. (eds) 2014. Cambro-Ordovician Studies V. *Memoirs of the Association of Australasian Palaeontologists* **45**, 419pp.
- Paterson, J.R. 2014. Trilobites in early Cambrian tidal flats and the landward expansion of the Cambrian explosion: Comment. *Geology* **42**, e341.
- Paterson, J.R., Edgecombe, G.D. & Jago, J.B. 2014. The ‘great appendage’ arthropod *Tanglangia*: biogeographic connections between early Cambrian biotas of Australia and South China. *Gondwana Research*.
- Smith, P.M., Brock, G.A. & Paterson, J.R. 2015. Fauna and biostratigraphy of the Cambrian (Series 2, Stage 4; Ordian) Tempe Formation (Pertaoorrta Group), Amadeus Basin, Northern Territory. *Alcheringa*.
- Smith, P.M., Paterson, J.R. & Brock, G.A. 2015. Trilobites from the Giles Creek Dolostone (Cambrian Series 3, Stage 5; Templetonian), Amadeus Basin, central Australia. *Papers in Palaeontology*.

Emma Sherratt is working on the evolution of *Anolis* and *Sphaerodactylus* lizards in the Caribbean. She has been studying Miocene amber fossils, primarily from the Dominican Republic, to reveal how morphological variation in these ecologically diverse groups has changed through time. This work is done in collaboration with

researchers at Harvard University, the Smithsonian Natural History Museum, Sam Houston State University and Villanova University in the USA.

Castañeda, M. D. R., Sherratt, E., and Losos, J.B. 2014. The Mexican amber anole, *Anolis electrum*, within a phylogenetic context: implications for the origins of Caribbean anoles. *Zoological Journal of the Linnean Society* **172**, 133-144.

Stephen Wroe is an Associate Professor in the Zoology Department within the School of Environmental and Rural Science at UNE. Wroe's background is in zoology, palaeontology, phylogenetics, ecology and biogeography. He currently applies sophisticated 3D computer imaging and engineering softwares, as well as shape analyses, to address the relationships between form and function in living and extinct species within evolutionary contexts. Taxa investigated range from ancient fish to Neanderthals and modern humans.

He is Director of the Function, Evolution and Anatomy Research lab (FEARlab) - a multidisciplinary team operating across the School of Environmental and Rural Sciences (UNE) and the School of Engineering at the University of Newcastle. In 2013 he was awarded two large ARC Discovery grants as 1st CI and a level 2 Discovery Outstanding Researcher Award. The 1st of these focuses on digitally reconstructing and explaining the characteristic facial morphology of Neanderthals (with co-CIs Dr Luca Fiorenza (UNE) and Dr Will Parr (UNSW)), the 2nd (with co-CI Dr Vera Weisbecker (UQ)) investigates the reptile-mammal jaw transition (a textbook example of evolutionary transformation).

Wroe's research group includes newly appointed Lecturer Dr Emma Sherratt, Postdoctoral Fellow and Research Assistant Dr Marie Attard, (a second postdoc, Justin Ledogar will join the team next year). He currently supervises 3 PhD and 2 Honours students at UNE and further co-supervises four others at other institutions.

As well as the two Discovery projects noted above Wroe's group is involved in a wide range of projects applying virtual reconstruction and Finite Element Analyses in analyses including: mechanics of fighting in the giant extinct Irish elk, comparisons of cranial mechanics in the extinct moa of New Zealand, modelling different surgical treatments of human mandibular fractures, mechanics of egg breakage, broad-based modelling of mammalian carnivore mechanics, microbiomechanics of human hyoid bones and cranial mechanics of toothed whales.

Aquilina, P., Wroe, S., Clausen, P., Chamoli, U. & Parr, W. 2013. Finite element analysis of 3 patterns of internal fixation of mandibular condyle fractures. *The British Journal of Oral & Maxillofacial Surgery* **51**, 326-331.

Aquilina, P., Wroe, S., Clausen, P., Chamoli, U. & Parr, W. 2014a. Finite Element Analysis of Patient-Specific Condyle Fracture Plates. *Craniomaxillofacial Trauma and Reconstruction* **4**, 251-232.

Aquilina, P., Wroe, S., Clausen, P., Chamoli, U. & Parr, W. 2014b. A biomechanical comparison of three 1.5mm plate and screw configurations and a single 2.0mm plate for internal fixation of a mandibular condylar fracture. *Craniomaxillofacial Trauma and Reconstruction* **7**, 218-223.

Attard, M.R.G., Parr, W.C.H., Wilson, L.A.B., Archer, M., Hand, S., Rogers, T.L. & Wroe, S. 2014. Virtual reconstruction, biomechanical modeling and prey size preference of the Australian mid Cenozoic thylacinid, *Nimbacinus dicksoni* (Thylacinidae, Marsupialia). *PLOS ONE*, **9**(4), e93088

- Ferrara T., Boughton P., Slavich E. & Wroe, S. 2013. A novel method for single sample multi-axial nanoindentation of hydrated heterogeneous tissues based on testing great white shark jaws. *PLoS ONE* **8**(Issue 12), e82261.
- Field, J., Wroe, S., Trueman, C., Garvey, J. & Wyatt-Spratt, S. 2013. Looking for the Archaeological Signature in Australian Megafaunal Extinctions. *Quaternary International* **285**, 76-88
- Fiorenza, L., Benazzi, S., Henry, A., Salazar-García, D.C., Blasco, R., Picin, A., Wroe, S. & Kullmer, O. 2014. (1st published online) To meat or not to meat? New perspectives on Neanderthal ecology. *American Journal of Physical Anthropology*. DOI: 10.1002/ajpa.22659
- Fry, B.G., Scheib, H., Messenger, K., Hocknull, S., Wroe, S., Sunagar, K., Goldstein, E.J.C., Tyrrell, K.L., Citron, D.M. & Jackson, T.N.W. in press. "Poisons and bacteria" in Venomous reptiles and their toxins: evolution, pathophysiology and biodiscovery. Oxford University Press, Oxford.
- Lawn, B., Bush, M., Barani, A., Constantino, P. & Wroe, S. 2013. Inferring Biological Evolution from Fracture Patterns in Teeth. *Journal of Theoretical Biology* **338**, 59-65.
- Parr, W., Chamoli, U., Walsh, W., Jones, A. & Wroe, S. 2013. Finite element micro-modelling of a human ankle bone reveals the importance of the trabecular network to mechanical performance: and new methods for the generation and comparison of 3D models. *Journal of Biomechanics* **46**, 200-205.
- Walmsley, C.W., Smits, P.D., Quayle, M.R., McCurry, M.R., Richards, H.S., Oldfield, C. C., Wroe, S., Clausen, P.D. & McHenry, C.R. 2013. Why the Long Face? The Mechanics of Mandibular Symphysis Proportions in Crocodiles: *PLoS ONE* **8**, e53873.
- Wroe S., Chamoli U., Parr W., Clausen P., Ridgely R. & Witmer L. 2013. Comparative Biomechanical Modeling of Metatherian and Placental Saber-Tooths: A Different Kind of Bite for an Extreme Pouched Predator. *PLoS ONE* **8**, e66888.
- Wroe, S., Field, J., Archer, M., Grayson, D.K., Price, G.J., Louys, J., Faith, J.T., Webb, G.E., Davidson, I. & Mooney, S. 2013. Climate change frames debate over the extinction of megafauna in Sahul (Pleistocene Australia-New Guinea). *Proceedings of the National Academy of Sciences USA* **110**, 8777-8781.
- Wroe, S., Field, J., Archer, M., Grayson, D.K., Price, G.J., Louys, J., Faith, J.T., Webb, G.E., Davidson, I. & Mooney, S. 2013. No empirical evidence for human overkill of megafauna in Sahul. *Proceedings of the National Academy of Sciences USA*, published ahead of print July 25, 2013, doi:10.1073/pnas.1310440110.

Macquarie University

Matthew Kosnik (Department of Biological Sciences) is working with molluscan material preserved in modern marine sediments to address questions in conservation palaeobiology and taphonomy. Currently writing up work based on samples from One Tree Island (GBR), completing fieldwork examining the Holocene sediment accumulating in Port Hacking and Pittwater, and beginning to write up work based on samples from Port Jackson.

Briner, J., Kaufman, D.S., Bennike, O. & Kosnik, M.A. 2014. Amino acid ratios in reworked marine bivalve shells constrain Greenland Ice Sheet history during the

Holocene. *Geology* **42**, 75-78.

Patrick M. Smith (Department of Biological Sciences) is a second year PhD student supervised by Glenn A. Brock. He is continuing to investigate the richly fossiliferous and hydrocarbon-bearing sedimentary rocks of the Cambrian Pertaoorrtta Group in the Amadeus Basin, Northern Territory. Patrick's PhD studies largely focus on taxonomic documentation and biostratigraphy of important fossil groups from the Cambrian Series 2–3 (Ordian–Mindyallan) units of the Pertaoorrtta Group. Presently he is describing the trilobites from the Goyder Formation, in and around, the Ross River Gorge area. Along side these descriptions he is also working on using trilobite biostratigraphy to correlate the stable carbon isotopic excursion (“OETE”) identified in the Giles Creek Dolostone at Ross River Gorge. The outcomes of these studies will be to develop a well constrained, high resolution, quantitative biostratigraphy of the Pertaoorrtta Group in the Amadeus Basin. This will allow for precise correlation of sedimentary packages in surface outcrop and subsurface drillcore. It also will provide new data to assist with geospatial modelling, including interpretations associated with future geological mapping, sequence stratigraphy and geophysical surveys of the basin.

Smith, P.M., Brock, G.A., Paterson, J.R. & Topper, T.P. 2014. New bradoriid arthropods from the Giles Creek Dolostone (Cambrian Series 3, Stage 5; Templetonian), Amadeus Basin, central Australia. *Memoirs of the Association of Australasian Palaeontologists* **45**, 233-248.

Smith, P.M., Brock, G.A. & Paterson, J.R. 2014. Fauna and biostratigraphy of the Cambrian (Series 2, Stage 4; Ordian) Tempe Formation (Pertaoorrtta Group), Amadeus Basin, Northern Territory. *Alcheringa* **39**. doi: 10.1080/03115518.2014.951917.

Andrew Simpson is now an Honorary Fellow in the Department of Ancient History at Macquarie Uni. He is rediscovering the joys of palaeontology through work on Early Devonian conodonts from western New South Wales with David Mathieson, Ruth Mawson and John Talent. He is also rediscovering some Ordovician and Silurian conodont projects from New South Wales and Queensland.

Barry Webby continues to be fully occupied by checking of near-finalized *Treatise* versions for the scheduled two-volume work on the “Hypercalcified Porifera”. The material was previously submitted to the *Treatise* office in Lawrence, Kansas by the fifteen, globally widely dispersed, authors of the project, then edited by Jill Hardesty in that office, and published in 40 separate chapters of the newly established *Treatise Online* (that is, between 2010-2013). The current expectation is that the two, traditional, *Treatise* “blue-books” now in final assembly with the editorial support of Jill Hardesty, Elizabeth Brosnius and others, will go to press later this year, or early 2015. In total, the volumes will comprise well in excess of 1200 pages in print. The aim of the two volumes is to present comprehensive introductions and systematic descriptions of all the main hypercalcified fossil sponge groups—namely, archaeocyaths, stromatoporoids and chaetetids—and also to overview two other hypercalcified fossil sponge groups that display sphinctozoan and inozoan-type

morphologies [these latter were described systematically in another *Treatise* volume in 2004 by Finks & Rigby]. Additionally, the present volumes include, descriptions and discussions of the few known “living-fossil” hypercalcified sponges.

Other studies will be resumed next year as the above-mentioned *Treatise* work concludes. These include a number of collaborative projects, such as: (1) continuing long-term studies of Silurian-Devonian stromatoporoids from the Broken River region of North Queensland; (2) description of Ordovician sphinctozoans and other hypercalcified sponges from Kazakhstan; and (3) work on a few remaining undescribed Ordovician trilobites from central New South Wales.

Nestor, Heldur & Webby, Barry D. 2013. Biogeography of the Ordovician and Silurian Stromatoporoidea. *In*: Harper, D.A.T. & Servais, T. (eds) Early Palaeozoic Biogeography and Palaeogeography. *Geological Society, London, Memoirs* **38**, 67-79. <http://dx.doi.org/10.1144/M38.7>.

University of New South Wales
School of Biological, Earth & Environmental Sciences

Rick Arena (Evolution of Earth & Life Systems Research Group) works on the palaeontology, geology and biostratigraphy of Australian Cenozoic vertebrate fossil deposits with a focus on those at the Riversleigh World Heritage Area in northwest Queensland.

[Refereed papers]

- Archer, M., Arena, D.A., Bassarova, M., Beck, R., Black, K., Boles, W.E., Brewer, P., Cooke, B.N., Crosby, K., Gillespie, A., Godthelp, H., Hand, S.J., Holt, T., Kear, B., Louys, J., Morrell, A., Muirhead, J., Roberts, K.K., Scanlon, J.D., Travouillon, K.T. & Wroe, S. 2006. Current status of species-level representation in faunas from selected fossil localities in the Riversleigh World Heritage Area, northwestern Queensland. *Alcheringa Special Issue* **1**, 1-17.
- Archer, M., Arena, D.A., Bassarova, M., Black, K., Brammall, J., Cooke, B., Creaser, P., Crosby, K., Gillespie, A., Godthelp, G., Gott, M., Hand, S.J., Kear, B., Krikmann, A., Mackness, B., Muirhead, J., Musser, A., Myers, T., Pledge, N., Wang, Y. & Wroe, S. 1999. The evolutionary history and diversity of Australian mammals. *Australian Mammalogy*, **21**, 1-45.
- Arena, D.A. 1997. The palaeontology and geology of Dunsinane Site, Riversleigh. *Memoirs of the Queensland Museum* **41**, 171-179.
- Arena, D.A. 2008. Exceptional preservation of plants and invertebrates by phosphatization, Riversleigh, Australia. *PALAIOS* **23**, 495–502.
- Arena, D.A., Archer, M., Godthelp, H., Hand, S.J. & Hocknull, S. 2011. Hammer-toothed 'marsupial skinks' from the Australian Cenozoic. *Proceedings of the Royal Society B*, **278**, 3529-3533.
- Arena, D.A., Black, K.H., Archer, M., Hand, S.J., Godthelp, H. & Creaser, P. 2014. Reconstructing a Miocene pitfall trap: recognition and interpretation of fossiliferous Cenozoic palaeokarst. *Sedimentary Geology*. doi: 10.1016/j.sedgeo.2014.01.005.
- Woodhead, J., Hand, S.J., Archer, M., Graham, I., Sniderman, K., Arena, D.A., Black, K.H., Godthelp, H., Creaser, P. & Price, L. 2014. Developing a radiometrically-dated chronologic sequence for Neogene biotic change in Australia, from the Riversleigh World Heritage Area of Queensland. *Gondwana Research*.

[Conference papers and presentations]

- Arena, D.A. 1998. Exceptional preservation from Dunsinane Site. *Abstracts of the 2nd Riversleigh Symposium, December 3-4, UNSW*, 1.
- Arena, D.A. 2005. The geological history and development of the Riversleigh terrain during the middle Tertiary. *Programme and Abstracts, 10th Conference on Australasian Vertebrate Evolution, Palaeontology & Systematics and Quaternary Extinctions Symposium*, 11.
- Arena, D.A. 2006. New marsupial taxa with unique dental specialisations from Riversleigh. *Riversleigh Symposium 2006 Program and Abstracts*, 7.
- Arena, D.A. 2006. Processes in karst terrains and interpretation of Riversleigh palaeoenvironments. *Riversleigh Symposium 2006 Program and Abstracts*, 8.
- Arena, D.A. 2009. Riversleigh biostratigraphy: effects of karst processes. *Programme and Abstracts, 12th Conference on Australasian Vertebrate Evolution, Palaeontology & Systematics and Quaternary Extinctions Symposium*, 11.
- Arena, D.A. 2009. 'Marsupial skinks' from Riversleigh. *Programme and Abstracts, 12th Conference on Australasian Vertebrate Evolution, Palaeontology & Systematics and Quaternary Extinctions Symposium*, 11.
- Arena, D.A. & Black, K. 1997. An early-mid Miocene cave deposit at Riversleigh. *Conference on Australasian Vertebrate Evolution, Palaeontology and Systematics, Sydney, July 1997, Abstracts*, 10-11.
- Arena, D.A., Wroe, S. & Archer, M. 1998. Additional material referred to the dasyurid *Ganbulanyi djadjinguli*: phylogenetic and palaeobiological implications. *Abstracts of the 2nd Riversleigh Symposium, December 3-4, UNSW*, 1.
- Black, K.H., Archer, M., Hand, S.J. & Arena, D.A. 2013. The diversity and biostratigraphy of Riversleigh's diprotodontoids (Diprotodontidae, Palorchestidae): advances in understanding the biochronology of Australia's mammal-bearing fossil deposits. *Programme and Abstracts, 14th Conference on Australasian Vertebrate Evolution, Palaeontology & Systematics and Quaternary Extinctions Symposium*, 27.
- Graham, I.T., Archer, M., Hand, S., Godthelp, H., Price, E., Arena, R., Creaser, P., Black, K. & Zhao, L., 2011. Riversleigh: documenting 25 million years of geological evolution. *in: CAVEPS Perth 2011. 13th Conference on Australasian Vertebrate Evolution Palaeontology and Systematics April 27th-30th. Geological Survey of Western Australia, Record 2011/9*, 38.
- Woodhead, J., Archer, M., Hand, S., Godthelp, H., Graham, I., Creaser, P., Black, K., Arena, R. & Price, L., 2011. Preliminary radiometric ages for Cenozoic deposits in the Riversleigh World Heritage fossil area, NW Queensland. *in: CAVEPS Perth 2011. 13th Conference on Australasian Vertebrate Evolution Palaeontology and Systematics April 27th-30th. Geological Survey of Western Australia, Record 2011/9*, 87.

Elizabeth M. Dowding is currently undertaking an honours project on the palaeogeography of Early Devonian Eastern Gondwana (supervised by Malte C. Ebach).

Australian Museum, Sydney

Tegan A. Vanderlaan (Research Associate) was awarded her PhD from UNSW for her thesis on the Carboniferous and Permian trilobites of Eastern Australia (supervised by Malte C. Ebach and John R. Paterson). She is currently working on a systematic reappraisal of the trilobite family Phillipsiidae Oehlert, 1886.

- Ebach, M.C., Williams, D.M. & Vanderlaan, T.A. 2013. Implementation as Theory, Hierarchy as Transformation, Homology as Synapomorphy. *Zootaxa* **3641**, 587-594.
- Percival, I.G., Meakin, N.S. Sherwin, L. Vanderlaan, T.A. & Flitcroft, P.A. 2012. Permian fossils and palaeoenvironments of the northern Sydney Basin, New South Wales. *Geological Survey of New South Wales, Quarterly Notes* **138**, 1-23.
- Vanderlaan, T.A. 2011. Book Review. *Systematic Biology* **60**, 732-733.
- Vanderlaan, T.A. & Ebach, M.C. 2014. Systematic biostratigraphy: a solution to problematic classification systems in biostratigraphy. *Palaeoworld* **23**, 105-111.
- Vanderlaan, T.A. & Ebach, M.C. in press. A review of the Carboniferous and Permian trilobites of Australia. *Zootaxa*.
- Vanderlaan, T.A., Ebach, M.C., Williams, D.M. & Wilkins, J.S. 2013. Defining and redefining monophyly: Haeckel, Hennig, Ashlock, Nelson and the proliferation of definitions. *Australian Systematic Botany* **26**, 347-355.

University of Wollongong

Tony Wright is still working on an array of palaeontological topics as an honorary in the School of Earth & Environmental Sciences. **Ross McLean** has now joined the School as an honorary, and will no doubt be making inroads into NSW coral topics.

I am studying operculate corals from New South Wales, Queensland, Germany, Morocco, Poland and France. Studies of *Calceola* sensu stricto hinge on a definitive study of the quite poorly known type species *Calceola sandalina*, which will be based on Harald Prescher's collections from the Eifel. Sadly Harald died suddenly in August, and the full implications of his untimely death are uncertain.

As previously reported, a derivative from my Lyon visit concerns the operculate coral *Calceola gervillei* Bayle, 1878, known only from the Early Devonian of N  hou, France (the type material of which I found in the Lyon museum). For my joint study with Yves Plusquellec and R  my Gourvennec (Brest) of Devonian calceolides from Brittany, we have been allowed to borrow the Bayle type material. This MS seemed to be finalised until some of the original Collin material was found at the museum in Rennes.

I visited China in August 2014, and attended the IGCP 591 workshop in Kunming. Before the meeting I spent several days in the field in Guangxi province under the guidance of Kuang Guodan, hoping (with little success) to collect some critical Devonian calceolide material from the Lijiang area. This collecting did not yield any particularly significant material, but Kuang very kindly gave me some good material from his collections. After the Kunming meeting I visited Peking University, where I was fortunate to be able to study some of the type calceolide material described by Yoh & Yu (1957) and You (1988; =S.S. Yoh) in the Geological Museum. This study of Chinese material will provide a good platform for

comparisons of Chinese and Vietnamese calceolide species and assessment of biogeography and evolution of this group.

It is still hoped that the manuscript on an Early Devonian silicified fauna from near Mudgee will be finalised soon (Wright, Colquhoun et al., Early Devonian fossils from the Carwell Creek Formation, Mudgee district, New South Wales, Australia).

Wright, A.J. 2014. Evolution and biogeography of Silurian and Devonian operculate corals, 197-200. *In*: Zhan Renbin & Huang Bing (eds), *IGCP 591 Field Workshop 2014, Kunming China*. Nanjing University Press, Nanjing. 264 pp.

Geological Survey of New South Wales

Ian Percival (GSNSW Londonderry office) was gratified to see a considerable number of papers published this year that had been started (or in some cases completed and submitted) several years ago. Some of these papers tackled fields outside his normal comfort zone, with one reviewing palaeontological heritage legislation (or the lack of it) in Australia, another looking at the geochemistry of Ordovician cherts in the Lachlan Orogen (with Michael Bruce, a geochemist, as senior author), and finally a joint paper with multiple industry authors that appeared in *Economic Geology* on the geological setting of rocks hosting the Cadia gold-copper deposit (to which Ian contributed the biostratigraphy and a Silurian conodont figure). The backlog is not entirely cleared, but he is working on it – three manuscripts on Ordovician brachiopods from NSW are finally in the last stages of preparation. . Projects underway at present include a palaeoecological assessment of the early Silurian Cotton Hill Formation biota (with Geoff Thomas), a collaborative study with Des Strusz on the Silurian brachiopod fauna from Quidong, and revision of several Ordovician graptolite faunas from NSW (Ian is assuming a coordinating role in this project, leaving systematic descriptions in the safe hands of Petr Kraft, Yuandong Zhang and Lawrence Sherwin). Ordovician conodont studies continue with Yong Yi Zhen, with a manuscript (Quinton et al.) in revision on isotopic analyses of conodont apatite using specimens from Ordovician limestones throughout NSW. Ian participated in two IGCP 591 conferences this year, one in Estonia and the other in Yunnan province, China. He also somehow found time to edit *Ordovician News* for the Subcommittee on Ordovician Stratigraphy, and *Nomen nudum*.

Yong Yi Zhen (GSNSW Londonderry office) has been working with Ian Percival on various projects in collection management (digitization), in support of the Survey's regional geological mapping projects. He continues research into NSW lower Palaeozoic fossils (mainly conodonts) and their biostratigraphic applications. In April 2014 he visited Nanjing Institute of Geology and Palaeontology while on annual leave, and finalized a manuscript with colleagues in Nanjing and Zhejiang, which is now published in *Alcheringa*. In late September and early October, Yong Yi attended the 4th IPC in Mendoza, Argentina and delivered two oral presentations at Symposium 20, "Ordovician biotas of Gondwana: responses to global climatic and eustatic events, and their biogeographic relationships within the Ordovician world", and he also participated in the post-congress field trip in Argentine Precordillera.

[consolidated list of papers & abstracts]

- Branagan, D.F., Pickett, J.W. & Percival, I.G. 2014. Geology and geomorphology of Jenolan Caves and the surrounding region. *Proceedings of the Linnean Society of NSW* **136**, 99-130.
- Bruce, M.C. & Percival, I.G. 2014. Geochemical evidence for provenance of Ordovician cherts in southeastern Australia. *Australian Journal of Earth Sciences* **61**, 927-950. doi.org/10.1080/08120099.2014.956792
- Bruce, M.C. & Percival, I.G. 2014. Geochemistry of Ordovician cherts from southeastern Australia – a potential pointer to their provenance. Abstracts CD, AESC, Newcastle July 2014.
- Harris, A.C., Percival, I.G., Cooke, D.R., Tosdal, R.M., Fox, N., Allen, C.M., Tedder, I., McMillan, C., Dunham, P.D. & Collett, D. 2014. Marine volcanosedimentary basins hosting porphyry Au-Cu deposits, Cadia Valley, New South Wales, Australia. *Economic Geology* **109**(4), 1117-1135.
- Percival, I.G. 2014. Protection and preservation of Australia's palaeontological heritage. *Geoheritage* **6**, 205-216. DOI: 10.1007/s12371-014-0106-z
- Percival, I.G. & Kruse, P.D. 2014. Middle Cambrian brachiopods from the southern Georgina Basin of central Australia. *Memoirs of the Association of Australasian Palaeontologists* **45**, 349-402.
- Percival, I.G. & Kruse, P.D. 2014. Biostratigraphy and biogeographic affinities of middle to late Cambrian linguiliformean brachiopods in Australasia. In R.B. Zhan & B. Huang (eds): *IGCP 591 Field Workshop 2014, Kunming, China, Extended Summary volume*, 109-116. Nanjing University Press, Nanjing.
- Percival, I.G., Pickett, J., Engelbreetsen, M., Mathieson, D. & Farrell, J. 2014. Faunal communities and biostratigraphy of the late Silurian Molong Limestone, central New South Wales. In H. Bauert, O. Hints, T. Meidla & P. Männik (eds.): *4th Annual Meeting of IGCP 591, Estonia, 10-19 June 2014, Abstracts and Field Guide*, p.73. University of Tartu.
- Percival, I.G., Thomas, G. & Sherwin, L. 2014. The Cotton Formation at Forbes, central New South Wales: a window into a Silurian deep-water environment. In H. Bauert, O. Hints, T. Meidla & P. Männik (eds.): *4th Annual Meeting of IGCP 591, Estonia, 10-19 June 2014, Abstracts and Field Guide*, p.72. University of Tartu.
- Percival, I.G., Zhen, Y.Y., Simes, J.E. & Cooper, R.A. 2014. Furongian (late Cambrian) brachiopods and associated conodonts from the Takaka Terrane in the Springs Junction – Maruia area, South Island, New Zealand. *Memoirs of the Association of Australasian Palaeontologists* **45**, 55-70.
- Quinn, C.D., Percival, I.G., Glen, R.A. & Xiao, W.J. 2014. Ordovician marginal basin evolution near the palaeo-Pacific east Gondwana margin, Australia. *Geological Society of London, Journal* **171**, 723-736. DOI: 10.1144/jgs2012-034
- Wang, Z.H., Bergström, S.M., Zhen, Y.Y., Zhang, Y.D. & Wu, R.C. 2014. A revision of the Darriwilian biostratigraphic conodont zonation in Tangshan, Hebei Province based on new conodont collections. *Acta Palaeontologica Sinica* **53**(1), 1-15 (in Chinese with English abstract).
- Wu, R.C., Percival, I.G., Stouge, S. & Zhan, R.B. 2014. Conodont diversification during the Ordovician: A perspective from North China and Tarim (Northwestern China). *Science China: Earth Sciences* **57**, 397-407.
- Wu, R.C., Stouge, S., Percival, I.G. & Zhan, R.B. 2014. Early – Middle Ordovician conodont biofacies on the Yangtze Platform margin, South China: applications to paleoenvironment and sea-level changes. *Journal of Asian Earth Sciences* **96**, 194-204. DOI: 10.1016/j.jseaes.2014.09.003

- Zhang, Y.D., Zhen, Y.Y., Munnecke, A. & Chen, X., 2014. Multidisciplinary approaches to the Ordovician stratigraphy in China and their implications. Abstract Volume, 4th International Palaeontological Congress, September 28 – October 3, 2014 Mendoza, Argentina, p.342.
- Zhen, Y.Y. & Percival, I.G. 2014. Floian (Early Ordovician) conodont biogeography, biofacies, and biostratigraphy of the Australasian Superprovince. Abstract Volume, 4th International Palaeontological Congress, September 28 – October 3, 2014 Mendoza, Argentina, p.343.
- Zhen, Y.Y. & Percival, I.G. 2014. Floian (Early Ordovician) conodont biogeography, biofacies, and biostratigraphic correlation between Australia and South China. In Zhan Renbin & Huang Bing (eds), Extended Summary of the International Geoscience Programme IGCP Project 591 Field Workshop, August 2014, Kunming, 234-237. Nanjing University Press, Nanjing.
- Zhen, Y.Y., Percival, I.G. & Zhang, Y.D. 2014. Floian (Early Ordovician) conodont-based biostratigraphy and biogeography of the Australasian Superprovince. *Palaeoworld* **23**, doi.org/10.1016/j.palwor.2014.10.011
- Zhen, Y.Y. & Zhang, Y.D. 2014. Early Ordovician conodont biostratigraphy of the Jiangnan Slope, South China. In Zhan Renbin & Huang Bing (eds), Extended Summary of the International Geoscience Programme IGCP Project 591 Field Workshop, August 2014, Kunming, 238-241. Nanjing University Press, Nanjing.
- Zhen, Y.Y., Zhang, Y.D., Tang, Z.C., Percival, I.G. & Yu, G.H. 2014. Early Ordovician conodonts from Zhejiang Province, southeast China, and their biostratigraphic and palaeobiogeographic implications. *Alcheringa* **39**. DOI:10.1080/03115518.2015.958295

Lawrence Sherwin (GSNSW Orange office) has finished work on problematic correlations of Devonian formations in central NSW, with a resulting draft paper now in peer review. He is currently advising the NSW Planning Assessment Commission on potential conflicts between fossil sites and the Dubbo Zirconia project. Being now semi retired he has resumed work on some long delayed graptolite papers.

Northern Territory

Charles Darwin University, Darwin

James Valentine is continuing to investigate the relationships between morphospace and ecospace utilisation in the Burgess Shale and Chengjiang faunas. Two large databases documenting the morphology, skeleton types and ecospace use of all taxa in these two faunas will shortly be ready for data analysis.

He is continuing his work on Silurian oceanic turnover events. A manuscript documenting body size changes in acrotretid brachiopods during the Early Silurian Ireviken Event is nearly complete.

James has also continued to work with Macquarie University Ancient History PhD student, Aaron de Souza on the application of cladistics to Nubian ceramics. Preliminary results of this work were presented at the Third Australasian Egyptology Conference at Macquarie University in July.

Queensland

The University of Queensland, Brisbane School of Earth Sciences

Prof. Gregory E. Webb (Integrated Palaeoenvironmental Research Group) continues as the head of IPRG and is working on Holocene and Pleistocene reef formation in the southern Great Barrier Reef, the geochemistry of corals, carbonate sediments and vertebrate bones as environmental indicators, Mississippian coral faunas of eastern Australia, with Dr. Julien Denayer, who has now returned to Belgium after his time as Dorothy Hill Postdoctoral Fellow, and on Archean microbialites and their geochemistry based on material from the Pilbara. He has just successfully deployed a marine-based drilling rig to extract cores from the GBR as part of UQ- and ARC-funded research (see photograph, below).

Sadler, J., Webb, G.E. & Nothdurft, L.D. 2014. Structure and palaeoenvironmental implications of inter-branch coenosteum-rich skeleton in corymbose *Acropora* species. *Coral Reefs*. DOI 10.1007/s00338-014-1228-0 (accepted 1/10/2014- available online)

Sadler, J., Webb, G.E., Nothdurft, L.D. & Dechnik, B. 2014. Geochemistry-based coral palaeoclimate studies and the potential of 'non-traditional' (non-massive *Porites*) corals: recent developments and future progression. *Earth-Science Reviews* **139**, 291-316.

Kamber, B.S., Webb, G.E. & Gallagher, M. 2014. The rare earth element signal in Archean microbial carbonate: information on ocean redox and biogenicity. *Journal of the Geological Society* **171**, 745-763; doi10.1144/jgs2013-110



Coring rig deployed on Heron Reef, GBR, October 2014.

Kenny J. Travouillon (Integrated Palaeoenvironmental Research Group) is continuing his work on describing new taxa from Oligo-Miocene sites around Australia, such as Riversleigh World Heritage Area (Queensland) and the Etadunna Formation (South Australia), focusing on Peramelemorphia (bilbies and bandicoots) and Macropodiformes (kangaroos), their biostratigraphy and phylogeny.

- Bates, H., Travouillon, K.J., Cooke, B., Beck, R.M.D., Hand, S.J., & Archer, M. 2014. Three new Miocene species of musky rat kangaroos (Hypsiprymnodontidae, Macropodoidea): description, phylogenetics and palaeoecology. *Journal of Vertebrate Paleontology* **34**, 383-396.
- Beck, R.M.D., Travouillon, K.J., Aplin, K.P., Godthelp, H. & Archer, M. 2014. The osteology and systematics of the enigmatic Australian Oligo-Miocene metatherian Yalkaparidon (Yalkaparidontidae; Yalkaparidontia; ?Australidelphia; Marsupialia). *Journal of Mammalian Evolution* **21**, 127-172.
- Black, K.H., Travouillon, K.J., Den Boer, W., Kear, B.P., Cooke, B.N. & Archer, M. 2014. A new species of the basal “kangaroo” *Balbaroo* and a re-evaluation of stem macropodiform interrelationships. *PLoS ONE* **9**(11), e112705. doi:10.1371/journal.pone.0112705.
- Butler, K., Louys, J. & Travouillon, K.J. 2014. Extending dental mesowear analyses to Australian marsupials, with applications to six Plio-Pleistocene kangaroos from southeast Queensland. *Palaeogeography, Palaeoclimatology, Palaeoecology* **408**, 11-25.
- Gurovich, Y., Travouillon, K.J., Beck, R.M.D., Muirhead, J. & Archer, M. 2014. Biogeographical implications of a new mouse-sized fossil bandicoot (Marsupialia: Peramelemorphia) occupying a dasyurid-like ecological niche across Australia. *Journal of Systematic Palaeontology* **12**, 265–290.
- Travouillon, K.J., Archer, M., Hand, S.J. & Muirhead, J. 2014. Sexually dimorphic bandicoots (Marsupialia: Peramelemorphia) from the Oligo-Miocene of Australia, first cranial ontogeny for fossil bandicoots and new species descriptions. *Journal of Mammalian Evolution* DOI 10.1007/s10914-014-9271-8.
- Travouillon, K.J., Cooke, B., Archer, M., & Hand, S.J. 2014. Revision of basal macropodids from the Riversleigh World Heritage Area with descriptions of new material of *Ganguroo bilamina* Cooke, 1997 and a new species. *Palaeontologia Electronica* **17.1**, 20A.
- Travouillon, K.J., Hand, S.J., Archer, M., & Black, K.H. 2014. Earliest modern bandicoot and bilby (Marsupialia, Peramelidae and Thylacomyidae) from the Miocene of the Riversleigh World Heritage Area, northwestern Queensland, Australia. *Journal of Vertebrate Paleontology* **34**, 375-382.

Gilbert J. Price (Integrated Palaeoenvironmental Research Group) is an ARC DECRA Early Career Research Fellow. He is a vertebrate palaeoecologist and geochronologist, particularly interested in the evolution and emergence of Australia’s unique ecosystems and fauna, and their response to prehistoric climatic changes. His major research focus has been on the development of palaeoecological models for Australia’s Pleistocene megafauna. Critically, this also involves the production of reliably-dated records for the extinct forms. In addition to his ARC DECRA which focusses on late Quaternary palaeoecology of northern Queensland, he also has an ARC Discovery which aims to develop new direct dating methods (U-series and ESR)

of fossil vertebrates (in collaboration with Yue-xing Feng, UQ, and Renaud Joannes-Boyau, SCU). For pre-2014 publications see www.diprotodon.com

- Black, K., Louys, J. & Price, G.J. 2014. Understanding morphological variation in the extant koala as a framework for identification of species boundaries in extinct koalas (Phascolarctidae; Marsupialia). *Journal of Systematic Palaeontology* **12**, 237-264.
- Black, K.H., Price, G.J., Archer, M. & Hand, S.J. 2014. Bearing up well? Understanding the past, present and future of Australia's koalas. *Gondwana Research* **25**, 1186-1201.
- Louys, J.C., Corlett, R.T., Price, G.J., Hawkins, S. & Piper, P.J. 2014. Rewilding the tropics, and other conservation translocations strategies in the tropical Asia-Pacific region. *Ecology and Evolution* **4**(2), 4380-4398.
- Mackness, B., Black, K.H. & Price, G.J. in press 1/10/2014. Occurrence of *Euowenia grata* (De Vis, 1887) (Diprotodontidae, Marsupialia) from the Pliocene Spring Park Local Fauna, northeastern Queensland. *Alcheringa*.
- Sobbe, I.H. & Price, G.J. 2014. Confirmation of the presence of the Spotted - tailed Quoll, *Dasyurus maculatus* (Dasyuridae, Marsupialia) from the late Pleistocene King Creek catchment, Darling Downs, southeastern Queensland, Australia. *Memoirs of the Queensland Museum – Nature* **59**, 9-10.
- Wright, D.K., Thompson, J., Mackay, A., Welling, M., Forman, S.L., Price, G.J., Zhao, J.-x., Cohen, A.S., Malijani, O. & Gomani-Chindebvu, E. 2014. Renewed geoarchaeological investigations of Mwanganda's Village (Elephant Butchery Site), Karonga, Malawi. *Geoarchaeology* **29**, 98-120.

Peter Jell is working on the following:- (1) Redescription of Middle Cambrian echinoderms from western Queensland (*Cymbionites* and *Peridionites*) with Jim Sprinkle; (2) Cambrian faunas of western New South Wales (Cymbric Vale, Coonigan and Nootumbulla Formations); (3) Fossil Asterozoa of Australia (Ordovician to Tertiary); (4) Mesozoic and Tertiary crinoidea of Australia; (5) Fossil faunas of the Middle Cambrian Currant Bush Formation, Queensland.

- Jell, P.A. 2014. A Tremadocian asterozoan from Tasmania and a late Llandovery edrioasteroid from Victoria. *Alcheringa* **38**, 528-540.
- Jell, P.A. 2014. Cambrian trilobites of Heathcote district, central Victoria, Australia. *Acta Palaeontologica Sinica* **53**(4),
- Raven, R.J., Jell, P.A. & Knezour, R.A. (in press). *Edwa maryae* gen. et sp. nov. in the Norian Blackstone Formation of the Ipswich Basin — the first Triassic spider (Mygalomorphae) from Australia. *Alcheringa* **39**.

Geoffrey Playford's current research focuses mainly on Mississippian–Pennsylvanian palynostratigraphy of Eastern and Western Gondwana (Australia and northern Brazil). A current project is on diverse and well-preserved palynofloras of the northern Perth Basin that provide correlative links with eastern Australia (particularly) and elsewhere in Gondwana. Work continues on Mississippian palynostratigraphy of onshore, extensively-drilled basins of northern Brazil (Amazonas and Parnaíba basins) in collaboration with José Henrique Gonçalves de Melo of Petróleo Brasileiro S.A. (Petrobras) in Rio de Janeiro. PhD candidate **Gary Pattemore** is progressing well with his project on Triassic–Jurassic gymnosperms

(co-supervised with Gregg Webb, UQ, and John Rigby, QUT) and has undertaken extensive field collecting in SE Queensland.

Pattemore, G.A., Rigby, J.F. & Playford, G. 2014. *Palissy*: A global review and reassessment of Eastern Gondwanan material. *Review of Palaeobotany & Palynology* **210**, 50-61.

James Cook University, Townsville

Paul Dirks continues with his research around the recent discovery of *Anthropithecus sediba* in South Africa which has contributed a great deal to our understanding of hominid evolution. Ongoing research into the cave system adjacent to Johannesburg and its fossil contents continues to be highly productive and frames new questions and insights. The Malapa site is now recognised as the richest hominid repository known from Africa or elsewhere.

Eric Roberts and his post-graduates continue research into the East African Rift and its vertebrate fossil record. In addition Eric has recently taken part in a US National Science Foundation expedition to the Antarctic Peninsula with the focus of examining its fossil record leading up to the K-T boundary.

Based on West Australian collections, **Toni Williamson** and **Bob Henderson** have established a new dwarf belemnite genus within the Dimitobelidae, the distinctive Austral group so well represented in Australian Cretaceous faunas.

[consolidated list of publications]

Blackburn, D., Roberts, E.M. & Stevens, N.J. (in press). The earliest record of the endemic African frog Family Ptychadenidae from the Oligocene Nsungwe Formation of Tanzania. *Journal of Vertebrate Paleontology*.

Dirks, P.H.G.M. & Berger, L.R. 2013. Hominin-bearing caves and landscape dynamics in the Cradle of Humankind, South Africa. *Journal of African Earth Sciences* **78**, 109-131.

Gorscak, E., O'Connor, P.M., Stevens, N.J. & Roberts, E.M. 2014. The basal titanosaurian *Rukwatitan bisepultus* (Dinosauria: Sauropoda) from the middle Cretaceous Galula Formation, Rukwa Rift Basin, southwestern Tanzania. *Journal of Vertebrate Paleontology* **34**, 1133-1154.

Roberts, E.M., Jelsma, H. & Hegna, T. (in press). Mesozoic sedimentary cover sequences of the Congo Basin in the Kasai Region, Democratic Republic of Congo. In M. DeWit and F. Guillocheau (eds.), *Geology and Resource Potential of the Congo Basin—Dedicated to L. Cahen and H. Kampunzu*. Springer-Verlag, London.

Roberts, E.M., Lamanna, M.C., Clarke, J.A., Gorscak, E., Meng, J., Sertich, J.J.W., O'Connor, P.M., Claeson, K. & MacPhee, R.E.E. 2014. Stratigraphy and taphonomy of Latest Cretaceous vertebrates from Vega Island, James Ross Basin, Antarctica: implications for high-latitude terrestrial ecosystems. *Palaeogeography, Palaeoclimatology, Palaeoecology* **402**, 55-72.

Williamson, T. & Henderson, R.A. (in press). *Pumiliobelus*, a new dwarf coleoid genus (Belemnoidea:Dimitobelidae) from Western Australia. *Journal of Paleontology*.

Queensland Museum, Brisbane

Carole J. Burrow continues as an Honorary Research Fellow with the QM. Collaboration continues on acanthodians (and the occasional shark) from Scotland, other parts of Europe, and North America, as well as Australia. A manuscript on one 'special' fish - the first shark from the Gogo Formation in Western Australia - is now in revision having spent nearly 10 years brewing, with Carole being one of a multinational cast of authors. Rather than attending one of the 'big' VP conferences this year, she attended a 'small' regional meeting at Brecon, Wales, on the Old Red Sandstone, copresenting contributions on the Welsh Borderlands vertebrate microremains with Sue Turner and Rod Williams, and macroremains with Mike Newman, Bob Davidson, Jan den Blaauwen and Roger Jones. A highlight of the meeting was the enthusiastic attendance by so many local 'amateur' geology buffs from the thriving regional organisations, with the number of attendees being well over one hundred.

- Burrow, C.J. & Rudkin, D. 2014. Oldest near-complete acanthodian: the first vertebrate from the Silurian Bertie Formation Konservat-Lagerstätte, Ontario. *PLoS ONE* **9**(8), 7. [doi:10.1371/journal.pone.0104171](https://doi.org/10.1371/journal.pone.0104171)
- Newman, M.J., Burrow, C.J., Den Blaauwen, J.L. & Davidson, R.G. 2014. The Early Devonian acanthodian *Euthacanthus macnicoli* Powrie, 1864 from the Midland Valley of Scotland. *Geodiversitas* **36**(3), 321-348. [doi:10.5252/g2014n3a1](https://doi.org/10.5252/g2014n3a1)
- Trinajstić, K., Roelofs, B., Burrow, C.J., Long, J.A. & Turner, S. 2014. Devonian vertebrates from the Canning and Carnarvon Basins with an overview of Paleozoic vertebrates of Western Australia. *Journal of the Royal Society of Western Australia* **97**, 133-151.

Susan Turner (Geoscience Consultant) is Scientific Editor for *Acta Geologica Sinica* (CAGS) and holds Honorary Adjunct/Associate positions at Curtin University, Monash University, Queensland Museum Ancient Environments, and Honorary Research Associate of the New Brunswick Museum, Canada. She is a member of INHIGEO, HOGG and ESHG and editor for JHOST, Journal of History of Science and Technology, University of Lisbon.

In 2014 she has tried to return to scientific work, notably with a look again at the microvertebrates of the Lower 'Old Red Sandstone' of Britain, as well as continuing work on a Silurian and Devonian, often in collaboration with Carole Burrow, on material from Canada, Iran (Vachik Hairapetian), western China and Pakistan (with John Talent), Turkey, USA - Maine, Nevada, Idaho, UK - Welsh Borderlands and of course, Australia (Carole Burrow, John Long, Brett Roelofs, Kate Trinajstić et al.). Sue also continues work on Triassic and Jurassic sharks and recently was assisted at the Australian Museum by honorary palaeontologist, Bob Jones and volunteer Graham McLean.

Sue (along with Carole Burrow) is part of the group that continues to subvert the 'conodonts are vertebrates' mantra propounded over the last decades.

Sue contributes to IGCP projects 591 and 596. She has attended various conferences over the last two years, including giving talks at British VP meetings in Oxford (2012) and Edinburgh (2013) and in October 2014 attended the Old Red Sandstone Symposium in Wales. For more see: www.paleodeadfish.com

Burrow C.J., Turner, S., Nowlan, G.S. & Denison, R.H. 2013. Vertebrate

- microremains from the Late Silurian of Arisaig, Nova Scotia, Canada. *Journal of Paleontology* **87**(6), 1041-1059.
- Carlisle, G. & Turner, S. 2013. Sopwith's Surprise. *The Geoscientist*, March, 21-23. published February 25th. [http://www.geolsoc.org.uk/en/Geoscientist - March issue](http://www.geolsoc.org.uk/en/Geoscientist-March-issue)
- Itano, W. & Turner, S. 2013. Lost & Found. 267. Found in the Fossil Fish Collection of the Natural History Museum Palaeontology Section. *The Geological Curator*, GCG Newsletter 9, no. 8, p. 447-448. www.geologicalcurator.co.uk
- Itano, W. & Turner, S. 2013. Mystery Fossil 22. Pal Ass Newsletter 22, June, p.59.
- Maisey, J., Turner, S., Miller, R. & Naylor, G. 2014. Dental patterning in the earliest sharks: implications for tooth evolution. *Journal of Morphology*; online Dec 2013 DOI: 10.1002/jmor.20242
- Mark-Kurik E., Blicek A., Burrow C.J. & Turner, S. 2013. Early Devonian fishes from coastal De Long Strait, central Chukotka, Arctic Russia. *Geodiversitas* **35**, 545-578.
- Roelofs, B., Trinajstić, K., Turner, S., Hairapetian, V., Hansma, J. 2013. Vertebrate diversity and faunal turnover from the Late Devonian to Early Carboniferous in the Canning Basin, Western Australia. CAVEPS Abstract, Flinders Uni, Adelaide, 1 p.
- Trinajstić, K., Roelofs, B., Barham, M., Playton, T. & Turner, S. 2014. The utility of survivor taxa for microvertebrate biostratigraphy and chemostratigraphy in Devonian and Carboniferous sections, Canning Basin Western Australia. Geological Society of Australia, 2014 Australian Earth Sciences Convention (AESC), Sustainable Australia, Newcastle, 7-10 July 2014. Geological Society of Australia, Abstracts 110: 218.
- Trinajstić, K., Roelofs, B., Burrow, C.J., Long, J.A. & Turner, S. 2014. Devonian vertebrates from the Canning and Carnarvon Basins with an overview of Paleozoic vertebrates of Western Australia. *Journal of the Royal Society of Western Australia* **97**, 133–151.
- Turner, S. 2013. Geoheritage and Geoparks: One (Australian) Woman's Point of View. *Geoheritage* **5**, 249-264. DOI [10.1007/s12371-013-0085-5](https://doi.org/10.1007/s12371-013-0085-5)
- Turner, S. 2013. *Ageleodus* ~ widespread mid-Palaeozoic 'sharks' known only from teeth. Stan Wood Symposium, VPCA Edinburgh, Aug 27-30, Abstracts, 1p.
- Turner, S. 2013. 'Geotourism': Where Wise Birds Stay Awhile. see free app - *GeoExpro Magazine* for iPad, June, 1-6.
- Turner, S. Burrow, C.J. & Williams, R. 2014. Welsh Borderland bouillabaisse: bonebeds, age control, palaeo(bio)geography lifestyles and diversity of microvertebrates (thelodont, acanthodian, 'shark', placoderm scales). In: Old Red Sandstone Symposium, 3-5 October 2014, Elim Church Centre, Canal Road, Brecon, Powys, Programme and Abstracts.
- Turner, S., Greenwood, D. & Carlisle, G. 2013. Thomas Sopwith's 1839 Great Stratigraphic section. In: 24th ICSTM, Knowledge at Work, Manchester July 21-28, p. 275.
- Vickers-Rich, P., Turner, S & Australian IGCP Committee 2014. Special Report 1. No more Australian IGCP National Committee funding for Australian IGCP projects? *TAG* no. 171, June, 28-30.
- Wilkinson, J., Spring, K., Turner S. & Louys, J. 2013. The Chinchilla Rifle Range locality: Honouring past collectors and presenting a new detailed digital map. CAVEPS Abstract, Flinders Uni, Adelaide, p. x.

Geological Survey of Queensland

John McKellar reports on his publications this year: Palynofloras recovered by Bomfleur *et al.* (2014) from the Upper Triassic and Lower Jurassic of north Victoria Land (East Antarctica) suggest that the Hettangian (basal Jurassic) there is represented by unconformity. In the Australian region, from palynostratigraphic evidence (de Jersey & McKellar, 2013), and indeed globally (as indicated by the latter authors), there is widespread hiatus at this level, associated with poorly understood tectonism during the Hettangian – ?earliest Sinemurian. From the sequence-stratigraphic work of Ziolkowski *et al.* (2014), this event is represented in the Surat Basin (Queensland) by Sequence Boundary 1 (SB1) at the base of the Precipice Sandstone. SB1 separates this formation from the (older) stratigraphically and geographically isolated remnant strata of the early Hettangian Chong beds and the Rhaetian (latest Triassic) Eddystone beds at the base of the basin's succession.

Bomfleur, B., Schöner, R., Schneider, J.W., Viereck, L., Kerp, H. & McKellar, J.L. 2014. From the Transantarctic Basin to the Ferrar Large Igneous Province—New palynostratigraphic age constraints for Triassic–Jurassic sedimentation and magmatism in East Antarctica. *Review of Palaeobotany and Palynology*, **207**, 18–37.

Ziolkowski, V., Hodgkinson, J., McKillop, M., Grigorescu, M. & McKellar, J.L. 2014. Sequence stratigraphic analysis of the Lower Jurassic succession in the Surat Basin, Queensland — preliminary findings. *Queensland Minerals and Energy Review Series*, Department of Natural Resources and Mines, Queensland.

SOUTH AUSTRALIA

University of Adelaide

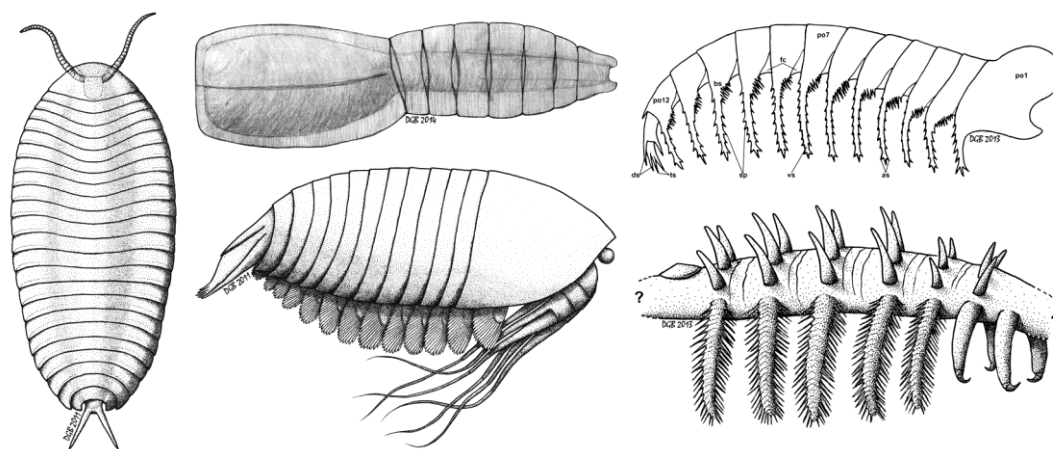
Diego C. García-Bellido is an *ARC Future Fellow* at the University of Adelaide (and Honorary Associate of the South Australian Museum) and was recently elected AAP Secretary (term 2014-2016). His main interest is the taxonomical diversity and functional morphology of the early metazoans generated during the Cambrian ‘explosion’, and the phylogenetic relationships between the animal groups that appeared with this unique evolutionary event. His present project aims at comparing the Ediacara biota with the Emu Bay Shale and other Cambrian *Lagerstätten* from a palaeoecological perspective, and looking at aspects such as predation and moulting on Modern marine invertebrates to test against what can be observed in the fossil record. Diego graduated in zoology at the Complutense University in Madrid, where he later completed his PhD in palaeontology (2002). His interest in early animal evolution took him to the University of Cambridge in 1994 and to the Burgess Shale (Canada) during the summers of 1995, 1997 and 2000. This was followed by a postdoc at the Royal Ontario Museum-Toronto (2003 and 2004) and several years at the Spanish Research Council (CSIC) in Madrid, where he run in parallel his interest on Burgess Shale faunas and on fossil Porifera (see publications below). Since 2007, Diego has been working with colleagues from the SAM, UniSA, UNE and NHM in excavating and studying the early Cambrian Emu Bay Shale Lagerstätte in Kangaroo Island, while collaborating with his Spanish partners in the Cambrian and Ordovician

faunas of Peri-Gondwana (Spain, Morocco, Argentina and Peru). In the last twelve months he has carried out two excavations at Emu Bay Shale, two field trips to the Flinders Ranges and one to the Andes of Northwestern Argentina. He has also recently published on the arthropods, lobopodians, worms and vetulicolians from Kangaroo Island, as well as trilobites from Spain and Morocco and ‘small shelly fossils’ from Spain. Several other manuscripts are in preparation on Australian and Spanish Cambrian and Ordovician material.

- Aceñolaza, G.F., Albani, R., Bernárdez, E., García-Bellido, D.C., Gutiérrez-Marco, J.C., Rábano, I. & Sá, A.A. 2014. First Furongian (late Cambrian) trilobites from the Cantabrian Zone (northwestern Spain). *Bulletin of Geosciences* **89**, 233–244.
- Barragán, T., Esteve, J., García-Bellido, D.C., Zamora, S. & Álvaro, J.J. 2014. *Hadimopanella oezgueli* Gedik, 1977: a palaeoscolecid sclerite inadequate for taxonomic purposes. *Palaeontologia Electronica* 17.3.42A: 1–20.
- Barragán, T., Esteve, J., García-Bellido, D.C., Zamora, S. & Álvaro, J.J. 2014. New mid-Cambrian palaeoscolecid sclerites of *Hadimopanella oezgueli* from the Cantabrian Mountains, northern Spain. *GFF* **136**, 22–25.
- García-Bellido, D.C., Lee, M.S.Y., Edgecombe, G.D., Jago, J.B., Gehling, J.G. & Paterson, J.R. 2014. A new vetulicolian from Australia and its bearing on the chordate affinities of an enigmatic Cambrian group. *BMC Evolutionary Biology* **14**, 214.
- Gutiérrez-Marco, J.C. & García-Bellido, D.C. *In press*. Micrometric detail in palaeoscolecid worms from Late Ordovician sandstones of the Tafilalt Konservat-Lagerstätte, Morocco. *Gondwana Research*. doi: 10.1016/j.gr.2014.04.006
- Gutiérrez-Marco, J.C., Sá, A.A., García-Bellido, D.C. & Rábano, I. 2014. The extent of the Middle Ordovician Dapingian Stage in peri-Gondwanan Europe and North Africa. Stratigraphic record, biostratigraphic tools, and regional chronostratigraphy. *GFF* **136**, 90–94.
- Rábano, I., Gutiérrez-Marco, J.C. & García-Bellido, D.C. 2014. A remarkable illaenid trilobite from the Middle Ordovician of Morocco. *Bulletin of Geosciences* **89**, 365–374.
- Creveling, J.C., Fernández Remolar, D., Rodríguez-Martínez, M., Menéndez, S., Bergmann, K.D., Gill, B.C., Abelson, J., Amils, R., Ehlmann, B.L., García-Bellido, D.C., Grotzinger, J.P., Hallmann, C., Stack, K.M. & Knoll, A.H. 2013. Geobiology of a lower Cambrian carbonate platform, Pedroche Formation, Ossa Morena Zone, Spain. *Palaeogeography, Palaeoclimatology, Palaeoecology* **386**, 459–478.
- Daley, A.C., Paterson, J.R., Edgecombe, G.D., García-Bellido, D.C. & Jago, J.B. 2013. New anatomical information on *Anomalocaris* from the Emu Bay Shale Konservat-Lagerstätte (Cambrian, South Australia) and a reassessment of its inferred predatory habits. *Palaeontology* **56**, 971–990.
- García-Bellido, D.C., Paterson, J.R. & Edgecombe, G.D. 2013. Cambrian palaeoscolecids (Cycloneuralia) from Gondwana and reappraisal of species assigned to *Palaeoscolex*. *Gondwana Research* **24**, 780–795.
- García-Bellido, D.C., Paterson, J.R., Edgecombe, G.D. & Ma, X.Y. 2013. A “Collins’ monster”-type lobopodian from the Emu Bay Shale Konservat-Lagerstätte (Cambrian), South Australia. *Alcheringa* **37**, 474–478.
- Paterson, J.R., García-Bellido, D.C. & Edgecombe, G.D. 2012. New artiopodan arthropods from the Early Cambrian Emu Bay Shale Konservat-Lagerstätte of South Australia. *Journal of Paleontology* **86**, 340–357.

- Edgecombe, G.D., García-Bellido, D.C. & Paterson, J.R. 2011. A new leanchoiliid megacheiran arthropod from the lower Cambrian Emu Bay Shale, South Australia. *Acta Palaeontologica Polonica* **56**, 385–400.
- García-Bellido, D.C. & Aceñolaza, G. 2011. The worm *Palaeoscolex* from the Cambrian of NW Argentina: extending the biogeography of Cambrian priapulids to South America. *Alcheringa* **35**, 531–538.
- Gehling, J.G., Jago, J.B., Paterson, J.R., García-Bellido, D.C. & Edgecombe, G.D. 2011. The geological context of the lower Cambrian (Series 2) Emu Bay Shale Lagerstätte and adjacent stratigraphic units, Kangaroo Island, South Australia. *Australian Journal of Earth Sciences* **58**, 243–257.
- Gutiérrez-Marco, J.C., Rábano, I. & García-Bellido, D. (eds.) 2011. *Ordovician of the World*. Instituto Geológico y Minero, Madrid. xvi+682 pp. ISBN: 9788478408573.
- Lee, M.S.Y., Jago, J.B., García-Bellido, D.C., Edgecombe, G.D., Gehling, J.G. & Paterson, J.R. 2011. Modern optics in exceptionally preserved Early Cambrian arthropod eyes from Australia. *Nature* **474**, 631–634.
- Paterson, J.R., García-Bellido, D.C., Lee, M.S.Y., Brock, G.A., Jago, J.B. & Edgecombe, G.D. 2011. Acute vision in the Cambrian predator *Anomalocaris* and the origin of compound eyes. *Nature* **480**, 237–240.
- Paterson, J.R., Edgecombe, G.D., García-Bellido, D.C., Jago, J.B. & Gehling, J.G. 2010. Nektaspid arthropods from the lower Cambrian Emu Bay Shale Lagerstätte, South Australia, with a reassessment of lamellipedian relationships. *Palaeontology* **53**, 377–402.
- Rábano, I., Sá, A.A., Gutiérrez-Marco, J.C. & García-Bellido, D.C. 2010. Two more Bohemian trilobites from the Ordovician of Portugal and Morocco. *Bulletin of Geosciences* **85**, 415–424.
- García-Bellido, D.C., Paterson, J.R., Edgecombe, G.D., Jago, J.B., Gehling, J.G. & Lee, M.S.Y. 2009. The bivalved arthropods *Isoxys* and *Tuzoia* with soft-part preservation from the lower Cambrian Emu Bay Shale Lagerstätte (Kangaroo Island, Australia). *Palaeontology* **52**, 1221–1241.
- García-Bellido, D.C., Vannier, J. & Collins, D. 2009. Soft-part preservation in two species of the arthropod *Isoxys* from the middle Cambrian Burgess Shale of British Columbia, Canada. *Acta Palaeontologica Polonica* **54**, 699–712.
- Gutiérrez-Marco, J.C., Sá, A.A., García-Bellido, D.C., Rábano, I. & Valério, M. 2009. Giant trilobites and trilobite clusters from the Ordovician of Portugal. *Geology* **37**, 443–446.
- Vannier, J., García-Bellido, D.C., Hu S.-X. & Chen, A.-L. 2009. Arthropod visual predators in the early pelagic ecosystem: evidence from the Burgess Shale and Chengjiang biotas. *Proceedings of the Royal Society - B* **276**, 2567–2574.
- García-Bellido, D.C., Gutiérrez-Marco, J.C. & Chacaltana, C.A. 2008. First soft-bodied fossil from the Ordovician of Peru. *Alcheringa* **32**, 313–320.
- Rábano, I., Gozalo, R. & García-Bellido, D. (eds.) 2008. *Advances in Trilobite Research*. 448 pp. Instituto Geológico y Minero, Madrid. ISBN 978-84-7840-759-0.
- García-Bellido, D.C. & Collins, D.H. 2007. Reassessment of the genus *Leanchoilia* (Arthropoda, Arachnomorpha) from the Middle Cambrian Burgess Shale, British Columbia, Canada. *Palaeontology* **50**, 693–709.
- García-Bellido, D.C., Gozalo, R., Chirivella Martorell, J.B. & Liñán, E. 2007. The demosponge genus *Leptomitrus* and a new species from the Middle Cambrian of Spain. *Palaeontology* **50**, 467–479.

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- García-Bellido, D.C. & Rodríguez, S. 2005. Palaeobiogeographical relationships of poriferan and coral assemblages during the late Carboniferous and the closure of the western Palaeotethys Sea-Panthalassan Ocean connection. *Palaeogeography, Palaeoclimatology, Palaeoecology* **219**, 321–331.
- García-Bellido, D.C. & Collins, D.H. 2004. Moulting arthropod caught in the act. *Nature* **429**, 40.
- García-Bellido, D.C. & Rigby, J. K. 2004. Devonian and Carboniferous sponges from Spain. *Journal of Paleontology* **78**, 431–455.
- García-Bellido, D. C., Senowbari-Daryan, B. & Rigby, J. K. 2004. *Cystothalamia vandegraaffi* new species and other Sphinctozoan sponges from the Upper Carboniferous of Spain. *Journal of Paleontology* **78**, 1037–1055.
- Senowbari-Daryan, B. & García-Bellido, D. 2002. “Sphinctozoa” or chambered sponges (polyphyletic), pp. 1511–1538. In: J.N.A. Hooper & R.W.M Van Soest (eds.). *Systema Porifera: A Guide to the classification of the Phylum Porifera*. Kluwer Academic/Plenum Press, 1810 pp.
- García-Bellido Capdevila, D. 2000. The Burgess Shale fossils at the Natural History Museum, London. *The Geological Curator* **7**, 141–148.
- García-Bellido Capdevila, D. & Conway Morris, S. 1999. New fossil worms from the Lower Cambrian of the Kinzers Formation, Pennsylvania, with some comments on Burgess Shale-type preservation. *Journal of Paleontology* **73**, 394–402.



Reconstructions of some Emu Bay Shale taxa from the early Cambrian of Kangaroo Island (from left to right and top to bottom): *Australimicola spriggi*, *Nesonektris aldridgei*, *Oestokerkus megacholix*, *Anomalocaris briggsi* appendage and indeterminate Loughishaniid lobopodian.

University of South Australia

Barbara Hardy Centre, School of Natural and Built Environments

Barry Cooper (Adjunct Associate Professor) is based at the Mawson Lakes campus with palaeo colleagues John Cann and Jim Jago. I have a long standing historical project with Jim that deals with Robert Bedford (well-known archaeo researcher) from the pre WW2 era and his tortuous relations with Sir Douglas Mawson.

Given my major involvement as Secretary General of the International Commission on the History of Geological Sciences (INHIGEO) and the Heritage Stone Task Group (HSTG), my palaeo research output has been minimal for many years. However, I have contributed to the history of palaeontology over the past ten years. Resulting papers, in chronological order have been:

- Cooper, B.J. & Jago, J.B. 2007. History of Cambrian Investigations in South Australia with particular reference to the biostratigraphy. *Memoir Association of Australasian Palaeontologists* **33**, 1-27.
- Cooper, B.J. & Jago, J.B. 2007. Early Understanding of the Cambrian in South Australia. *Special Publication, Earth Sciences History Group, Geological Society of Australia* **1**, 20-25.
- Sweet, W.C. & Cooper, B.J. 2008. Classic Paper: C.H. Pander's (1856) Introduction to Conodonts. *Episodes* **31**, 431-436.
- Cooper, B.J., Oldroyd, D., Turner, S. & Vickers-Rich, P. 2009. Reg Sprigg and the Ediacara fauna: an extraordinary discovery. *The Australian Geologist* **153**, 18.
- Jago, J.B. & Cooper, B.J. 2011. The Emu Bay Shale lagerstätte: a history of investigations. *Australian Journal of Earth Sciences* **58**, 235-241.
- Cooper, B.J. & Kidman, B. 2012. Ralph Tate (1840-1901): Pioneering Australian Geologist. Abstract #1336, 34th International Geological Congress, Brisbane Australia, August 2012. (Reprinted with commentary in Geological Society of Australia, *Earth Sciences History Group Newsletter* **43**, 16-17, December 2012).
- Cooper, B.J. 2014. Book Review: "The Great Fossil Enigma: The Search for the Conodont Animal" by Simon J. Knell. Indiana University Press 413pp (2013). *Earth Sciences History* **33**(1), 179-181.

Jim Jago (Adjunct Associate Professor) is continuing to work on the Cambrian trilobites of Tasmania, South Australia and Antarctica. Current projects include late Middle Cambrian trilobites from limestone olistoliths from northern Victoria Land, Antarctica (with Chris Bentley and Roger Cooper), and a late Cambrian fauna from the south coast of Tasmania (with John Laurie). In the last four years a lot of time has gone into the Big Gully biota, a Burgess Shale type fauna from Kangaroo Island. Workers on this project include Mike Lee, Jim Gehling, John Paterson, Greg Edgecombe, Diego Garcia-Bellido, Glenn Brock and Jim Jago. Other projects include sedimentology of the Lake Frome Group (with C. Gatehouse and T. Casey), the stratigraphy of the Kanmantoo Group (with J. Gum, A. Burt and P. Haines) and the history of geology (with B. Cooper).

- Álvarez, J.J., Ahlberg, P., Babcock, L.E., Bordonaro, O.L., Choi, D.K., Cooper, R.A., Ergaliev, G.Kh., Gapp, I.W., Ghobadi Pour, M., Hughes, N.C., Jago, J.B., Korovnikov, I., Laurie, J.R., Lieberman, B.S., Paterson, J.R., Pegel, T.V., Popov, L.E., Rushton, A.W.A., Sukhov, S.S., Tortello, M.F., Zhou, Z. & Żylinska, A. 2013. Global Cambrian trilobite palaeobiogeography assessed using parsimony analysis of endemism. In Harper, D.A.T. & Servais, T. (eds) *Early Palaeozoic Biogeography and Palaeogeography. Geological Society of London Memoirs* **38**, 273-296.
- Bentley, C.J. & Jago, J.B. 2014. A Cambrian Series 3 (Guzhangian) fauna with *Centroporella* from Christmas Hills, northwestern Tasmania. *Memoirs of the Association of Australasian Palaeontologists* **46**, 267-296.

- Cann, J.H., Lower, C. & Jago, J.B. 2014. Provenance and sediment characteristics of contemporary gravel deposits at Sellicks Beach, eastern shore of Gulf St Vincent, South Australia. *Australian Journal of Earth Sciences* **61**, 819-836.
- Jago, J.B. & Gatehouse, C.G., 2014. A small trace fossil assemblage from the ?middle Cambrian Pantapinna Sandstone, Flinders Ranges, South Australia and its palaeoenvironmental significance. *Australian Journal of Earth Sciences* **61**, 837-841.

Flinders University, Adelaide
School of Biological Sciences

Trevor Worthy (Vice-Chancellor's Postdoctoral Research Fellow) reports that it has been a big year in Palaeontology at Flinders University in 2014. The new Vertebrate Palaeontological Laboratories were built and near completed by July. They were officially opened on 11 December by Professor Tim Flannery, so now we hold pride of place in corridors off the main entrance to the Biology Building.

My research interests focus on birds, with outputs not in the last *Nomen nudum* listed below. Projects continue on fossil birds and other vertebrates from the Early Miocene St Bathans Fauna of New Zealand, Moa and other Quaternary taxa from NZ, and Neogene birds of Australia. A highlight of the year was the understanding that kiwi and elephant birds are sister taxa – rather an unexpected relationship! A current focus in Australian research involves understanding the diversity and relationships of dromornithids, but there is a large void to fill re Neogene avifaunas for Australia so I expect I won't run out of things to do for a while. To help in this task **Warren Handley**, who finished Honours with First Class this year on sexual dimorphism in dromornithids, will commence a PhD in 2015 on these and other fowl.

- Chambers, G.K. & Worthy, T.H. 2013. Our evolving view of the kakapo and its allies. *Notornis* **60**(3), 197-200.
- Collins, C.J., Rawlence, N.J., Worthy, T.H., Scofield, R.P., Tennyson, A.J.D., Smith, I., Knapp, M. & Waters, J.M. 2014. Pre-human New Zealand sea lion (*Phocarctos hookeri*) rookeries on mainland New Zealand. *Journal of the Royal Society of New Zealand* **44**(1), 1-16.
- De Pietri, V., Camens, A.B. & Worthy, T.H. 2015. A new species of "Plains-wanderer" (Aves: Pedionomidae) from the Oligocene of South Australia reveals lineage longevity on the continent. *Ibis* **157**, 68-74.
- Hand, S.J., Worthy, T.H., Archer, M., Worthy, J.P., Tennyson, A.J.D. & Scofield, R.P. 2013. Miocene mystacinids (Chiroptera: Noctilionoidea) indicate a long history for endemic bats in New Zealand. *Journal of Vertebrate Paleontology* **33**(6), 1442-1448.
- Lalas, C., Hamel, J., Tennyson, A.J.D. & Worthy, T.H. 2014. Southern extensions for Holocene records of Australian pelican (*Pelecanus conspicillatus*) and New Zealand musk duck (*Biziura delautouri*) in New Zealand. *Notornis* **61**, 106-108.
- Lee, M. & Worthy, T.H. 2014. Flight of the kiwi. *Australasian Science* September 2014, 22-24.
- Mitchell, K.J., Llamas, B., Soubrier, J., Rawlence, N.J., Worthy, T.H., Wood, J., Lee, M.S.Y. & Cooper, A. 2014. Ancient DNA reveals elephant birds and kiwi are sister taxa and clarifies ratite bird evolution. *Science* **344**, 898-900.

- Nguyen, J.M.T., Boles, W.E., Worthy, T.H., Hand, S.J. & Archer, M. 2014. New specimens of the logrunner *Orthonyx kalidownyeri* (Passeriformes: Orthonychidae) from the Oligo-Miocene of Australia. *Alcheringa* **38**(2), 245-255.
- Nguyen, J.M.T., Worthy, T.H., Boles, W.E., Hand, S.J. & Archer, M. 2013. A new cracticid (Passeriformes: Cracticidae) from the Early Miocene of Australia. *Emu* **113**, 374-382.
- Worthy, T.H., Anderson, A. & Sand, C. 2013. An extinct Austral snipe Aves: *Coenocorypha* from New Caledonia. *Emu* **113**, 383-393.
- Worthy, T.H., Worthy, J.P., Tennyson, A.J.D. & Scofield, R.P. 2013. A bittern (Aves: Ardeidae) from the Early Miocene of New Zealand. *Paleontological Journal* **47**(11), 1331-1343.
- Worthy, T.H., Worthy, J.P., Tennyson, A.J.D., Salisbury, S.W., Hand, S.J. & Scofield, R.P. 2013. Miocene fossils show that kiwi (Apteryx, Apterygidae) are probably not phyletic dwarves. Pp 63–80, In Göhlich, U.B. & Kroh, A. (eds): *Paleornithological Research 2013 – Proceedings of the 8th International Meeting of the Society of Avian Paleontology and Evolution*. p. I-XXX + 1-306, Vienna (Natural History Museum Vienna).

Vanesa De Pietri spent 2014 at Flinders University on a post-doc. While working on the fossil waders (Charadriiformes) of New Zealand and Australia, she finished up projects on the European Neogene.

- De Pietri, V.L., Camens, A.B. & Worthy, T.H. 2015. A Plains-wanderer (Pedionomidae) that did not wander plains: a new species from the Oligocene of South Australia. *Ibis* **157**, 68–74.
- De Pietri, V.L. & Mayr, G. 2014. The enigmatic *Ibidopodia* from the early Miocene of France –The first Neogene record of Cariamiformes (Aves) in Europe. *Journal of Vertebrate Paleontology* **34**(6), 1470–1475.
- De Pietri, V.L. & Mayr, G. 2014. The phylogenetic relationships of the early Miocene stork *Grallavis edwardsi*, with comments on the interrelationships of living Ciconiidae (Aves). *Zoologica Scripta* **43**(6), 576–585.
- De Pietri, V.L. & Mayr, G. 2014. Re-appraisal of early Miocene rails (Aves, Rallidae) from central France: diversity and character evolution. *Journal of Zoological Systematics and Evolutionary Research* **52**(4), 312–322.
- De Pietri, V.L. & Scofield, R.P. 2014. The earliest European record of a Stone-curlew (Charadriiformes, Burhinidae) from the late Oligocene of France. *Journal of Ornithology* **155**(2), 421–426.
- Mayr, G. & De Pietri, V.L. 2014. Earliest and first Northern Hemispheric hoatzin fossils substantiate Old World origin of a “Neotropic endemic”. *Naturwissenschaften* **101**(2), 143–148.

Rod Wells has three projects in the final stages of preparation, viz. (i) A reconstruction and analysis of the biomechanics of the skeleton of *Thylacoleo*, in association with Peter Murray and Steve Bourne, (ii) A study of the Late Pleistocene vertebrate faunas and depositional environments of the eastern Mount Lofty and Flinders Ranges in South Australia including associated and articulated skeletons of *Diprotodon*, (iii) An analysis of the Plio-Pleistocene depositional environments and faunas of the Lake Eyre Basin with particular focus on the Warburton and Kalakooopah drainage. The latter two projects in association with Aaron Camens from

the Flinders Palaeo lab. and the late Richard Tedford from the American Museum of Natural History.

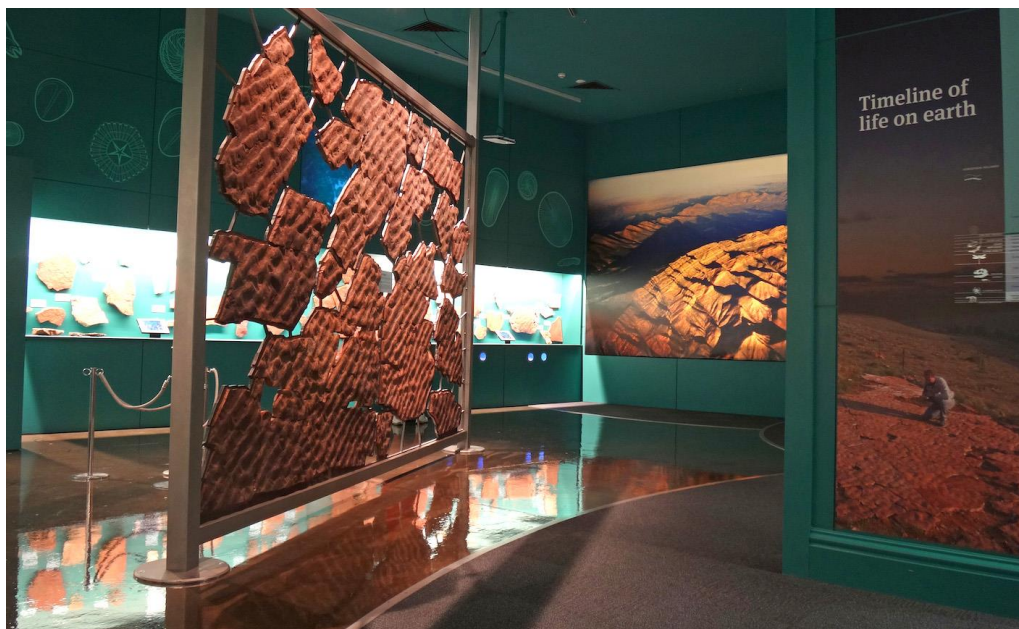
Aaron Camens has recently taken up the position of Lecturer in Palaeontology at Flinders University. My research focus during this appointment is centred on the deposits of the Lake Eyre basin and will investigate aspects of the taxonomy, palaeoecology and stratigraphy of the sites and their contained faunas.

I am also in the final stages of writing up several collaborative projects including: i) documentation of numerous vertebrate trace fossil sites from the southern coast of Australia, including the description of Australia's first Pleistocene vertebrate ichnotaxa; ii) a project investigating human colonisation of the Indian Ocean, with special focus on Madagascar; iii) investigation of biting traces on middle Miocene bones from a lacustrine site in New Zealand, and iv) investigation of Late Pleistocene vertebrate fossil localities of the eastern Mt. Lofty and Flinders Ranges.

De Pietri, V., Camens, A.B. & Worthy, T.H. 2015. A new species of “Plains-wanderer” (Aves: Pedionomidae) from the Oligocene of South Australia reveals lineage longevity on the continent. *Ibis* **157**, 68-74.

Llamas, B., Brotherton, P., Mitchell, K.J., Templeton, J.E.L., Thomson, V.A., Metcalf, J.L., Armstrong, K.N., Kasper, M., Richards, S.M., Camens, A.B., Lee, M.S.Y. & Cooper, A. 2015. Late Pleistocene Australian marsupial DNA clarifies the affinities of extinct megafaunal kangaroos and wallabies. *Molecular Biology and Evolution*, doi:10.1093/molbev/msu338

South Australian Museum, Adelaide



Ediacara Fossil Gallery — South Australian Museum

Jim Gehling (South Australian Museum and University of Adelaide) saw the completion of the Ediacara Fossil Gallery, with funds raised by members of the Ediacara Foundation (chaired by Mary Lou Simpson), and from Beach Energy, with the launch in December 2013. Jim is glad to get back to research on Ediacaran fossils

from the Flinders Ranges and to a lesser extent on the Cambrian fossils of Emu Bay Kangaroo Island. Steps are being taken by the Nature Foundation of South Australia to purchase Nilpena Pastoral Lease in the Flinders Ranges in order to ensure the future conservation of the National Heritage Listed Ediacara fossil site at Nilpena. In collaboration with Mary Droser and her students (University of California, Riverside), Mary-Anne Binnie (Collection Manager, Palaeontology SA Museum) and long term volunteers, our field work at Nilpena has concentrated on mapping the full extent, both stratigraphically and geographically, of facies bearing fossils of the Ediacara biota, along with palaeoecological studies of the serially excavated fossil beds. Excavations at of a selected fossiliferous facies at the Ediacara Conservation Park, north of Nilpena, continue to produce fossils that are an order of size smaller than is common elsewhere in Flinders Ranges. These have been the subjects of research project by graduate student, Felicity Coutts (University of Adelaide). Diego Garcia-Bellido (Future Fellow, University of Adelaide) has begun to extend his research interests to investigation of the Ediacara biota with preliminary trips with Jim to Ediacara and other sites in the Flinders Ranges in 2014. In association with the 3rd International Conference of Geobiology in Wuhan, a field workshop conducted by the Ediacaran Subcommittee of the ICS in South China in June, demonstrated the potential for intercontinental comparisons of Ediacara fossils and their biostratigraphic importance in future subdivision of the Ediacaran.

- Droser, M.L., Gehling, J.J., Dzaugis, M.E., Kennedy, M.J., Rice, D. & Allen, M.F. 2014. A New Ediacaran fossil with a novel sediment displacive life habit. *Journal of Paleontology* **88**, 145-151.
- García-Bellido, D.C., Lee, M.S., Jago, J.B., Gehling, J.G. & Paterson, J.R. 2014. A new vetulicolian from Australia and its bearing on the chordate affinities of an enigmatic Cambrian group. *BMC Evolutionary Biology* **14**, 214. Doi:10.1186/s12862-014-0214-z.
- Gehling, J.G., Runnegar, B.N. & Droser, M.L., 2014. Scratch traces of large Ediacaran bilaterian animals. *Journal of Paleontology* **88**, 284-298.
- Gehling, J.G. & Droser, M.L., 2014. How well do fossil assemblages of the Ediacara Biota time? Forum Reply. *Geology*, **42**. Doi:10.1130/G35403Y.1
- Joel, L., Droser, M.L. & Gehling, J.G. 2014. A new enigmatic, tubular organism from the Ediacara Member, Rawnsley Quartzite, South Australia, *Journal of Paleontology* **88**, 253-262.
- Nettle, D., Halverson, G.P., Cox, G.M., Collins, A.S., Schmitz, M. Gehling, J.G., Johnson, P.R. & Kadi, K. 2014. A middle-late Ediacaran volcano-sedimentary record from the eastern Arabian-Nubian shield. *Terra Nova* **26**, 120–129. Doi: 10.1111/ter.12077.

Michael Lee (South Australian Museum and University of Adelaide) continues to work on several aspects of vertebrate - and lately invertebrate - evolution. In particular, new Bayesian methods which co-estimate phylogeny as well as rates and patterns of evolution through time are being developed.

- Beck, R. & Lee, M.S.Y. 2014. Ancient dates or accelerated rates? The tempo of morphological evolution in placental mammals. *Proceedings: Biological Sciences* **281**: e20141278.
- Garcia-Bellido, D.C., Lee, M.S.Y., Edgecombe, G.D., Jago, J.B., Gehling, J.G. & Paterson, J.R. 2014. A new vetulicolian from Australia strengthens chordate

- affinities of an enigmatic Cambrian group. *BMC Evolutionary Biology* **14**: e214 doi:10.1186/s12862-014-0214-z
- Lee, M.S.Y., Cau, A., Naish, D. & Dyke, G.J. 2014. Sustained miniaturisation and evolutionary novelty in the dinosaurian ancestors of birds. *Science* **345**, 562-566.
- Lee, M.S.Y., Cau, A., Naish, D. & Dyke, G.J. 2014. Morphological clocks in palaeontology, and a mid-Cretaceous origin of crown Aves. *Systematic Biology* **63**, 442-449.
- Llamas, B., Brotherton, P., Mitchell, K.J., Templeton, J., Thomson, V.A., Metcalf, J., Armstrong, K.N., Kasper, M., Richards, S.R., Camens, A.R., Lee, M.S.Y. & Cooper, A. (in press). Upper Pleistocene Australian marsupial DNA clarifies the affinities of extinct megafaunal kangaroos and wallabies. *Molecular Biology and Evolution*.
- Long, J.A., Mark-Kurik, E., Johanson, Z., Lee, M.S.Y., Young, G.C., Zhu, M., Ahlberg, P.E., Newman, M., Jones, R., den Blaauwen, J., Choo, B. & Trinajstić, K. 2014. Reproductive structures in antiarch placoderms and early origins of vertebrate copulation. *Nature* doi:10.1038/nature13825
- Mitchell, K.J. Llamas, B., Soubrier, J., Rawlence, N.J., Worthy, T.H., Lee, M.S.Y. & Cooper, A. 2014. Ancient DNA unites elephant birds with kiwis and clarifies ratite evolution. *Science* **344**, 898-900.
- Mitchell, K.J., Pratt, R.C., Watson, L.N., Gibb, G.C., Kasper, M., Edson, J., Hopwood, B., Male, D., Armstrong, K., Meyer, M., Hofreiter, M., Austin, J., Donnellan, S.C., Lee, M.S.Y., Phillips, M.J. & Cooper, A. 2014. Molecular phylogeny, biogeography, and habitat preference evolution of marsupials. *Molecular Biology and Evolution* **31**, 2322-2330. doi: 10.1093/molbev/msu176
- Oliver, P.M., Skipwith, P. & Lee, M.S.Y. 2014. Crossing the line: ecological release in body size in a trans-Wallacean gecko radiation. *Biology Letters*. doi: 10.1098/rsbl.2014.0479
- [Articles for General Audience]
- Garcia-Bellido, D. & Lee, M.S.Y. 2014. Meet our weirdest ever cousins. *Australasian Science* Dec 2014, 32-33.
- Lee, M.S.Y. 2014. Flying Dinosaurs: How fearsome reptiles became birds (Book Review & Essay). The Conversation, Sept 1, 2014. (online news article, theconversation.edu.au)
- Lee, M.S.Y., 2014. Survival of the littlest. *Australasian Science* Oct 2014: 20-22,
- Lee, M.S.Y. 2014. Michael S.Y. Lee - interview. In *Issues in Palaeobiology: a Global View* (M. R. Sanchez-Villagra & N. MacLeod, eds). Scindige Hall Verlag. Zurich. Pp.135-141.
- Lee, M.S.Y. & Dyke, G.J. 2014. How small birds evolved from giant meat eating dinosaurs. The Conversation, Aug 1, 2014. (online news article, theconversation.edu.au)
- Lee, M.S.Y. & Worthy, T.W. 2014. Flight of the kiwi. *Australasian Science* Sept 2014: 22-24.

Pierre Kruse (Honorary Associate, South Australian Museum) continues work on his epic Ajax Mine biostratigraphic study, jointly with Françoise Debrenne (ex Muséum National d'Histoire Naturelle (MNHN), Paris). He is pleased to report that after four long years, on 28 August the South Australian Heritage Council designated Ajax Mine as a place of palaeontological and geological significance and added it to the South Australian Heritage Register as a State Heritage Place. This should ensure

ongoing protection to this world-class archaeocyath locality, sited adjacent to an intermittently active mining operation.

Two papers were published during the year, both in the *AAP Memoirs*. A follow-up summary paper with Ian Percival (Geological Survey of NSW, Sydney) will delineate a brachiopod-based biozonation for the Australian middle Cambrian, based on samples from the Georgina Basin. A comprehensive paper on the Lower Ordovician Florina Formation of the Daly Basin, with Tim Munson (NT Geological Survey, Darwin), is still in progress, as is research on cryptic archaeocyaths at Las Ermitas, Spain with Elena Moreno-Eiris (Universidad Complutense, Madrid).

Nearly all of August to October was devoted to an around-the-world conference crawl, firstly to the IGCP 591 Field Workshop in Kunming, China, then, after a month at the MNHN in Paris (working on Ajax Mine archaeocyaths), to the joint International Subcommission on Ediacaran Stratigraphy (ISES)-International Subcommission on Cambrian Stratigraphy (ISCS) field meeting in Ouarzazate, Morocco, and finally to the 4th International Palaeontological Congress in Mendoza, Argentina.

At long last, the end of the *Porifera revised*, volume 4 of the *Treatise on Invertebrate Paleontology* is in sight, with publication scheduled for January 2015. This will be 20 years since Pierre first began work on his contribution.

Kruse P.D. & Reitner, J.R. 2014. Northern Australian microbial-metazoan reefs after the mid-Cambrian mass extinction. *Memoirs of the Association of Australasian Palaeontologists* 45, 31-53.

Percival I.G. & Kruse P.D. 2014. Middle Cambrian brachiopods from the southern Georgina Basin of central Australia. *Memoirs of the Association of Australasian Palaeontologists* 45, 349-402.

Neville Pledge (Honorary Associate, South Australian Museum) currently has a couple of articles submitted for publication, which have occupied his attention for most of this year. One, a short paper notifying the discovery of marine fossils in an upland setting in the southern Mount Lofty Ranges, describes two teeth of an extinct and possibly new species of Port Jackson shark, *Heterodontus* sp. as a new record for the State. The other shark teeth present, collected by the local farmer, are too damaged to indicate a more precise age than ‘early-middle Tertiary’.

The main work of the year has been the revision and updating of a study of new material of the enigmatic possible possum *Ektopodon*, including a description of an almost-complete upper jaw bone (maxilla). This particular bone had previously been speculated about, based on an incomplete bone from the related *Chunia illuminata*, but the new specimen even surpassed that in its “coefficient of weirdity”. With new digital requirements for journals, my old photographs were not good enough and new images were taken and compiled into plates with the help of A. Tindall, who is currently digitising the SA Museum’s entomological collections.

Fossiliferous concentrate collected at Lake Ngapakaldi years ago is being examined minutely by volunteer Jenni Thurmer, who has participated in many expeditions to Lake Palankarinna etc. Many isolated, mostly broken marsupial and other teeth have been isolated, including those of ringtails and wallabies. The prize has been the second known tooth, an upper molar, of the koala *Litokoala kutjamarpens*. Although this is slightly damaged, it is an important addition to the collection. Surprisingly for being the type locality of *Ektopodon serratus*, for which Stirton had several different specimens to describe, no more material has turned up.

This must illustrate that the deposit is not a simple channel, but a complex mess of inter-nested channels of different ages and/or ecologies.

Tasmania

Pat Quilty reports that Dr Max Banks died on 24 November 2014. Max will be widely remembered as the leader in Tasmanian palaeontology/stratigraphy for several decades since moving here in 1947 as the first appointment by Prof. S. Warren Carey to his new department at the University of Tasmania. An obituary is in press in the *Papers and Proceedings of the Royal Society of Tasmania* and another is in preparation for *The Australian Geologist* (TAG). The story of Max has taken up a lot of my time lately.

Corbett, K.D., Quilty, P.G. & Calver, C.M. (eds) 2014. *Geological Evolution of Tasmania*. Geological Society of Australia Special Publication No. **24**. 660 pp.
Quilty, P.G. & Whitehead, J. 2014. *Allopolymorphina*: a new Pliocene polymorphinid genus from Flinders Island, Tasman Sea. *Journal of Foraminiferal Research* **44**, 445-451.

Victoria

The University of Melbourne www.earthsci.unimelb.edu.au

The School of Earth Sciences at the University of Melbourne has several staff working on a variety of palaeontological research themes. Our research interests range from the origin of animal life in the Cryogenian 650 million years ago (Wallace) to Mesozoic to Cenozoic foraminifera, environments and palynomorphs from northwest and southeast Australia (Gallagher, Wallace, Holdgate, Tosolini, Wagstaff, McLaren, Cupper). Our research has been supported by an ARC Discovery grant during this time. Other research includes dating mega-marsupial and early human fossils (Cupper). Several PhD, MSc and Honours students have successfully completed palaeontology projects over the last 2 years. A full list of our staff, students and publications follows:

Staff:

Assoc Prof. Malcolm Wallace – Reader: Neoproterozoic Cryogenian Life and reefs

Assoc. Prof. Stephen Gallagher – Reader: Mesozoic to Cenozoic micropalaeontology and palaeoceanography using foraminifera;

Dr. Sandra McLaren – Lecturer/Research Fellow: dating the onset of aridity in Australia

Dr. Anne-Marie Tosolini – Lecturer: Cretaceous to Paleogene palaeobotany of Antarctica and southeast Australia; a.tosolini@unimelb.edu.au

Dr Matt Cupper – Research Fellow: dating megafauna sites and human fossils

Dr Guy Holdgate - Research Fellow: the palaeoenvironmental evolution of Cenozoic brown coal

Dr. Barbara Wagstaff – Research Fellow: Mesozoic to Cenozoic palynology
Dr Ashleigh Hood – Research Fellow Cryogenian geochemistry

Recent Grants:

ARC Discovery 2013-2015: Wallace/Gallagher

Oxygenation of the oceans and the origin of animals.

Post graduate students (current):

PhD: Simone de Morton – Carboniferous carbonates and stratigraphy.

PhD: Tony Sandler – Echinoid taxonomy in the Miocene Mannum Limestone.

MPhil: Ngoc Nguyen – Palynostratigraphy and climate of the Eocene.

Post graduate completions (2013-2014):

2014 PhD: Ashleigh Hood – Cryogenian reefs and dolomites.

2014 MSc: Matthew Consolmagno – Late Pleistocene stratigraphy of the Northwest Shelf.

2014 MSc: Hugh Elder – Forams and facies of the Great Barrier Reef

2014 MSc: Jackson McCaffrey – Oligocene environment and stratigraphy of Torquay.

2014 MSc: Sade Forbes - The basin-basement contact in the onshore Gippsland Basin.

2013 PhD: Peter Hoiles – Biogeography of the Indo-Pacific Warm Pool during the Quaternary.

2013 MSc: Dale Mitchell – Stratigraphy of the Brighton Limestone, Flinders Ranges, S.A.

2013 MSc: Steven Dewar – Lake Bungunnia Limestone, Murray Basin, southeastern Australia.

BSc (Hons) completions:

2014 Vera Korasidis – Palynology of Early Cretaceous in the Otway Basin.

2014 Jack O'Callaghan – Seismic stratigraphy of the reefs on the Northwest Shelf.

2013 Natasha van Leeuwen – Carbonates and stromatolites of the West Basin Lake, Western Victoria.

2013 Thomas Agar – Optical dating of megafauna trace fossils in the Bridgewater Formation, Victoria, and implications for aeolianite depositional environments.

Palaeontology related Publications (2013-2014):

Cantrill, D.J., Bamford, M.K., Wagstaff, B.E. & Sauquet, H. 2013. Early Eocene fossil plants from the Mwadui kimberlite pipe, Tanzania. *Review of Palaeobotany and Palynology* **196**, 19-35.

Expedition 346 Scientists, 2014. Asian Monsoon: onset and evolution of millennial-scale variability of Asian monsoon and its possible relation with Himalaya and Tibetan Plateau uplift. *IODP Preliminary Report*, **346**.
doi:10.2204/iodp.pr.346.2014

Gallagher, S.J., Wallace, M.W., Hoiles, P.W. & Southwood, J.M. 2014. Seismic and stratigraphic evidence for reef expansion and onset of aridity on the Northwest Shelf of Australia during the Pleistocene. *Marine and Petroleum Geology* **57**, 470-481. Doi:10.1016/j.marpetgeo.2014.06.011

Gallagher, S.J., Exon, N., Seton, M., Ikehara, M., Hollis, C.J., Arculus, R., D'Hondt, S., Foster, C., Gurnis, M., Kennett, J.P., McKay, R., Malakoff, A., Mori, J., Takai, K. & Wallace, L. 2014. Exploring new drilling prospects in the southwest Pacific.

- Scientific Drilling* No. **2**, 1-6. doi:10.5194/sd-2-1-2014.
- Gallagher, S.J., Villa, G., Drysdale, R.N., Wade, B.S., Scher, H., Li, Q., Wallace, M.W. & Holdgate, G.R. 2013. A near field sea level record of East Antarctic Ice Sheet instability from 32 to 27 Million Years Ago. *Paleoceanography* **28**, 1-13. doi:10.1029/2012PA002326.
- Gallagher, S.J., Fulthorpe, C.S. & Bogus, K.A. 2014. Reefs, Oceans, and Climate: a 5 million year history of the Indonesian Throughflow, Australian monsoon, and subsidence on the Northwest Shelf of Australia. *International Ocean Discovery Program Scientific Prospectus*, **356**. doi.org/10.14379/iodp.sp.356.2014
- Holdgate, G.R., Wallace, M.W., Sluiter, I.R.K., Marcuccio, D., Fromhold, T.A. & Wagstaff, B.E. 2014. Was the Oligocene-Miocene a time of fire and rain? Insights from brown coals of the southeastern Australia Gippsland Basin. *Palaeogeography, Palaeoclimatology, Palaeoecology* **411**, 65-78. DOI: 10.1016/j.palaeo.2014.06.004
- Hood, A.V. & Wallace, M.W. 2014. Marine cements reveal the structure of an anoxic, ferruginous Neoproterozoic ocean. *Journal of the Geological Society*. <http://dx.doi.org/10.1144/jgs2013-099>.
- Li, C-L., Bye, J.A.T., Gallagher, S.J. & Cowan, T. 2013. Annual sea surface temperature lag as an indicator of regional climate variability. *International Journal of Climatology* **33**, 2309-2317.
- McLaren, S.N., Wallace, M.W., Gallagher, S.J., Wagstaff, B.E. & Tosolini, A-M., 2013. The development of a climate – an arid continent with wet fringes. In, Prins, H. & Gordon, I. eds., *Invasion Biology and Ecosystem Theory* (Cambridge University Press).
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John Buckeridge continues his work on the palaeontology, palaeoecology, biology and distribution of marine invertebrates. An early 20th Century interpretation of the late Cretaceous to Palaeocene fossil *Waiparaconus* as a cirripede is addressed in a paper with co-authors Hamish Campbell (GNS) and Pierre Maurizot (BRGM) in *Integrative Zoology*. With a stratigraphic distribution ranging from the Antarctic Peninsula, Australia, New Caledonia to New Zealand, *Waiparaconus* is now interpreted as a pennatulacean.

A new deep-sea stalked cirripede, *Vulcanolepas scotiaensis* is described from active seafloor venting on the Scotia Ridge, to the East of the Antarctic Peninsula. This extends the range of the neolepadine barnacles to the Atlantic Ocean.

Collaboration with colleagues at the University of Otago (Daphne Lee and Jeff Robinson) on a very localized, but nonetheless remarkable shelly marine deposit in Southland, New Zealand has resulted in description of one of the most diverse shallow-water barnacle assemblages known, with nine species recorded, five of which are new.

Burrows of the thalassinid shrimp *Ophiomorpha beaumarisensis* from the type locality, Rickett's Point, Beaumaris, VIC.

Paul Ter is writing up his thesis on ichnofossils in the Port Phillip area (see figure opposite). He has plans to subdivide the Beaumaris Sandstone into three distinct palaeoecologic units.

The type section of the Beaumaris Sandstone lies on Crown Land adjacent to a motor yacht club that is currently applying for planning approval to extensively expand its footprint along the coast. Their development, if it proceeds, will deleteriously impact the most important Cainozoic fossil location in Australia. This is particularly worrying as the club's "conservation track record" to date is poor, and many of the diverse vertebrate and invertebrate faunas in the Beaumaris Sandstone are found nowhere else. This exemplifies the ongoing struggle that many of us have in geoconservation - where the rights of developers sometimes transcend good stewardship. Environmental ethics remains a focus for the group, with a 'snap-shot' of Australian environmental issues being published in *Integrative Zoology*.



Buckeridge, J.S. 2014. Environmental Ethics: an overview, assessing the place of bioscientists in society, supplemented with selected Australian perspectives. *Integrative Zoology* **9**(1), 14-23. [dx.doi.org/10.1111/1749-4877.12028](https://doi.org/10.1111/1749-4877.12028)

Buckeridge, J.S., Campbell, H.J. & Maurizot, P. 2014. Unravelling the nature of *Waiparaconus*, a pennatulacean (Cnidaria: Octocorallia) from the late Mesozoic-early Cainozoic of the Southern Hemisphere. *Integrative Zoology* **9**, 111–120. [dx.doi.org/10.1111/1749-4877.12060](https://doi.org/10.1111/1749-4877.12060)

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- Buckeridge, J.S., Linse, K. & Jackson, J.A. 2013. *Vulcanolepas scotiaensis* sp. nov., a new deep-sea scalpelliform barnacle (Eolepadidae: Neolepadinae) from hydrothermal vents in the Scotia Sea, Antarctica. *Zootaxa* **3745**(5), 551–568.
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- Kočová Veselská, M., Kočí, T. & Buckeridge, J.S. 2013. A systematic review of *Stramentum* (*Stramentum*) *pulchellum* (G.B. Sowerby jr, 1843) (Cirripedia, Thoracica, Stramentidae) from the Bohemian Cretaceous Basin, the Czech Republic. *Acta Musei Nationalis Pragae, Ser. B. – Historia Naturalis* **69**(3-4), 151-158.
- Ren, G., Buckeridge, J.S. & Li, J. 2014. Estimating Land Subsidence Induced by Groundwater Extraction in Unconfined Aquifers Using an Influence Function Method. *Journal of Water Resources Planning and Management*. [doi: 10.1061/\(ASCE\)WR.1943-5452.0000479](http://doi.org/10.1061/(ASCE)WR.1943-5452.0000479)

Monash University

Applied Palaeontology and Basin Studies Group

The team's 2014 research led by **Jeff Stilwell** and **Chris Mays** has continued on systematic and applied palaeontology with respect to the predictability of petroleum-bearing facies, employing diverse, integrated methods in palaeontology, and pure basic research on palaeo-equator to poles Cretaceous and Paleogene biotas and palaeoenvironments during the last major greenhouse phase of the Phanerozoic. The group has submitted many confidential industry reports and peer-reviewed papers; many are listed below and several others have been submitted and are in review. Our current industry and institution portfolio includes Shell International, Shell Australia, Origin Energy, Cue Energy, RMA West Linapacan, Karoon Gas, Geoscience Australia, University of Texas-Austin, National Geographic Society, and Australian Research Council, among others. The last five years have seen a dramatic increase in research funding for the group of >\$1.7 million and number of keen graduate students in the field, with completed projects in the South Atlantic (Brazil-W Africa), New Zealand-Chatham Islands, Antarctica, Indonesia, Philippines, and many basins in Australia. During the last few years we have spread our collective 'wings', and we have started new projects with Cue Energy in Indonesia and RMA West Linapacan in the Philippines with promising results. This year **Conor McLaren** and **Mitchell O'Mara** completed exciting Honours projects with RMA on a new petroleum venture in the Palawan Basin in the Philippines, employing applied palaeontology and basin studies. Both Mitchell and Conor intend to start PhDs next year at Monash. Macrofossils discovered in deep water in the Perth Abyssal Plain have been studied this year by 2014 Honours student, **Tobin Wild**, with the first palaeontologic data being gathered from Batavia Knoll, with surprising results. Two papers are currently being prepared on the palaeontology and tectonic significance of the deep-water deposits. Toban intends to continue the study with Monash, UTAS and Sydney University in 2015 as a PhD investigation. All three students received top H1 Honours results with Conor leading with a fantastic 90 result and Mitchell and Tobin receiving 86, respectively.

Fieldwork has been conducted in the far reaches of the planet from Antarctica to Tanzania to remote areas in Tasmania. In March 2013 and 2014 **Jeff Stilwell**

participated on expeditions to the Antarctic Peninsula to search for Cretaceous fossils with his 2013 Honours student, **Kevin Chen**, and **Andrew (Drew) Giles** in 2014. A terrestrial assemblage of Aptian-Albian fossils was collected on Livingston Island (first ever fossils discovered in Walker Bay) and a paper will be submitted soon to *Alcheringa*. The 2014 expedition resulted in the discovery of suites of Late Cretaceous fauna and flora of 'The Naze' on James Ross Island and Humps Islands. Despite issues with the Argentine government on the return trip with respect to the collected fossils, negotiations continue with the Australian Antarctic Division and the Australian Embassy to work out a solution to the wrongfully confiscated material, despite the proper Antarctic Treaty documents carried during the expedition. Research continues also on early avian remains on the Chatham Islands with colleague, Julia Clarke, from the University of Texas-Austin, and we are close to submitting our first big paper on these important fossils. Other Takatika Grit fossils, collected by Jeff Stilwell, are being studied by Paul Scofield from the Canterbury Museum. In other new research, a major discovery by Jeff of the first Mesozoic and earliest Cenozoic, fossiliferous amber in southern Gondwana has seen a flurry of activity by him and his team (nationally and internationally) from 2012-14 on learning more about the Late Cretaceous (Turonian) bioinclusions in the resin from the Otway Basin and the early Paleogene fossiliferous amber from Western Tasmania, and the new terrestrial life that once existed in the high southern latitudes. Finishing PhD student, **Annie Quinney**, is currently working hard to learn more about the bioinclusions in the amber, the trees that produced the resin and also palaeoclimatic implications. Further, 2014 Honours student, **Will De Silva**, has studied the Western Tasmanian amber with associated fieldwork resulting in some biotic surprises in the amber, which are currently 'hush hush'. Will received an H1 result for his 2014 efforts. In fact, the fossil jewels in the amber are so significant that a new PhD student is being sought to study the deposit in more detail--any prospective, high achieving students are welcome to contact Jeff Stilwell at Jeffrey.Stilwell@monash.edu. Jeff received the excellent news in November 2013 that he was awarded an Australian Research Council Discovery Project grant (ARC-DP1412515; total funds of ~\$300K) for 2014-16(17) with colleagues, Prof. David Cantrill and Dr Dan Bickel, to study the bioinclusions in the amber. The DP project on the amber commenced formally in May 2014. In 2015, micro-CT and synchrotron imaging will continue on the amber, as the results this far have been phenomenal. There will also be another Honours project with new student, **Adele Pentland**, working on associated amber research.

Dr **Chris Mays** is presently researching the floral palaeoecology of polar and sub-polar palaeolatitudes of Eastern Gondwana (the Chatham Islands, New Zealand, and Winton, Queensland) during a period of global greenhouse conditions - specifically: the Mid-Cretaceous Thermal Maximum. The aims of this research are twofold: 1) to assess the ecological repercussions of a pivotal phase of floral evolution: the emergence of flowering plants as the dominant floral group on Earth; and 2) provide a palaeontological analogue of floral adaptation patterns and biogeographic distribution in response to extreme global warming. He presented his work at the 4th International Palaeontological Congress (IPC4) in Mendoza, Argentina, and published a taxonomic monograph on the the spore-pollen taxonomy of the mid-Cretaceous Chatham Islands, New Zealand (AAP Memoir #47, in press). In conjunction with Assoc. Prof. Jeffrey Stilwell, Chris has been supervising a PhD student, Annie Quinney, whose project has been focussing on the oldest recorded amber of Southern Gondwana. 2014 Honours student, **Elyse Butterfield**, has

researched floral palaeoecology and palaeoenvironments of Cretaceous fossils from the Eromanga Basin, Queensland with a Distinction result. **Hannah Carle** will head to the Chathams in 2015 for her Honours research with Jeff Stilwell and Chris Mays on the South Polar greenhouse Earth floras and environments.

Pedro A Viegas (Monash University, Melbourne) is a Natural History Curator and Conservator currently working on the ARC project "The first Mesozoic fossiliferous amber from Southern Gondwana". Pedro is managing both the laboratory and expedition sides of the project, developing new techniques for high definition and 3D imaging of amber inclusions, implementing new standards for the preparation and conservation of amber, advising and guiding students and researchers on their amber related investigations as well as developing and leading all field work related activities.

Staff Roles and Expertise for 2014-15:

Assoc. Prof. **Jeffrey Stilwell** (Chief Investigator and Leader) - Mesozoic-Cenozoic biostratigraphy, macro- and micropalaeontology, and palaeoenvironments

Prof. **Mike Hall** - Basin Analysis and seismic interpretation

Dr **Chris Mays** – Palaeobotany, palynology, biostratigraphy

Assoc. Prof. **Alan Tait** (Honorary Fellow) - Sedimentology and stratigraphy

Dr **Ray Bate (UK)** – Ostracod biostratigraphy – external consultant and advisor

Dr **Alan Partridge** (Biostrata Pty Ltd, Melbourne) - Palynomorph biostratigraphy – external consultant and advisor

Dr **Andre Coffa** (Pietrovin and RMA Energy, Melbourne) - Petroleum geoscience – external consultant and advisor

Dr **Daniel Thompson** (RMA Energy, Melbourne) – Petroleum geoscience – external consultant and advisor

Dr **Kath Grey** (Honorary Research Fellow; Geological Survey, WA (retired 2013)) - Microbialites, stromatolites, inter-tidal biostratigraphy and palaeoenvironments

Prof. **David Cantrill** (Research collaborator and advisor, Royal Botanic Gardens, Melbourne) – palaeobotany

Dr **Dan Bickel** (Research collaborator and advisor, Australian Museum, Sydney) – palaeoentomology

Dr **Sarah Martin** (Research collaborator and advisor, Geological Survey of Western Australia, Perth) – palaeoentomology

Dr **Han van Gorsel** (Adjunct Research Fellow, Houston, Texas, USA) – micropalaeontology and basin analysis

Current PhD, MSc and Honours Students and Projects at Monash

Mr **Hamed Aghaei** (PhD, completed 2014) – ‘The Structural, Stratigraphic and Hydrocarbon Potential Evolution of the Onshore Gippsland Basin, Victoria, Australia’

Mr **David Briguglio** (PhD) – ‘Structural and Stratigraphic Evolution of the Onshore Otway Basin, Western Victoria’

Mr **James Driscoll** (PhD) – ‘Upper Cambrian-Lower Ordovician sediments, northern Tasmania: An Analogue for the Development of Clastic Reservoirs’

Mr **Amir Mahmud** (PhD, completed 2014) – ‘Basin Evolution of Upper Cambrian-Ordovician Sediments in the West Coast Range of Tasmania’

Ms **Annie Quinney** (PhD) – ‘Diversity of inclusions in Late Cretaceous amber from the Otway Basin, Australia’. This discovery is significant not only because amber is

extremely rare in Australia, but this is also the oldest amber found in Australia. Furthermore, it has the potential to preserve high latitude flora and fauna from a time period in which little is known due to a poor fossil record.

Ms **Alana Sharp** (PhD, completed 2014) – ‘Cranial form and function of the largest ever marsupial, *Diprotodon optatum*: a comparative finite element analysis’. Alana’s PhD, under the supervision of Prof. Patricia Vickers-Rich and Dr. Tom Rich, investigated the cranial morphology and biomechanics of *Diprotodon* using 3D modelling and finite element analysis, with the aim of testing functional hypotheses concerning the extensive endocranial sinuses. Alana used a novel approach to 3D digitally reconstruct the jaw-closing muscles of *Diprotodon* to analyse jaw movements, muscle forces and bite force. For comparisons, Alana also reviewed the anatomy of *Vombatus ursinus* and *Phascolarctos cinereus* using dissections and CT and MRI technology. Results on the anatomy and biomechanics of *Diprotodon* and *V. ursinus* will be submitted for publication later this year. Finite element analysis of *Diprotodon*, and other species is also under-way. Alana presented preliminary results at SVPCA in Oxford (2012) and CAVEPS in Adelaide (2013) and studied under the supervision of Drs. Emily Rayfield and Jen Bright at the University of Bristol.

Mr **David Elliott** (PhD) – ‘Systematics and palaeoenvironments of the Ediacaran fauna’

Mr **Peter Trusler** (PhD) – ‘New insights into *Palorchestes*’

Ms **Shannon Herley** (PhD) – ‘The effects of a transitional tectonic environment on sedimentation processes in the Late Cretaceous, southeastern Australia’

Mr **Kevin Chen** (Honours H1 result, Dec. 2013)—‘Palaeoenvironmental reconstruction of Livingston Island, Antarctic Peninsula in the Early Cretaceous: interpretations from the Walker Bay Erratics’

Mr **Jesse Vitacca** (Honours H1 result, Dec. 2013)—‘Palaeoenvironmental evolution of the Mahakam Delta sequences of the Kutei Basin, Indonesia: employing biostratigraphy and basin analysis techniques’

Ms **Prudence Perry** (Honours H1 result, Dec. 2013)—‘Palaeoenvironmental reconstruction of the Cenozoic Mahakam Delta, Indonesia: characterisation of palynofacies and their associations using organic matter and marine microfossil assemblages’

Mr **Conor McLaren** (Honours H1 result, highest mark of 2014=90, Dec. 2014)—An assessment of the petroleum prospectivity of a Lower Miocene calciturbidite play: the West Linapacan B Structure, Northwest Palawan Basin, Philippines’

Mr **Mitchell O’Mara** (Honours H1 result, Dec. 2014)—Calciturbidite heterogeneity of the West Linapacan A Field, Philippines: an investigation of reservoir architecture and continuity through the use of high-resolution biostratigraphy and well correlation’

Mr **Toban Wild** (Honours H1 result, Dec. 2014)—The life and times of Batavia Knoll, Perth Abyssal Plain: new palaeontological insights into East Gondwana breakup during the mid-Cretaceous’

Mr **Will De Silva** (Honours H1 result, Dec. 2014)—Sub-polar fossiliferous amber from the Lower Eocene Macquarie Harbour Formation, Strahan, Tasmania: taxonomic composition and palaeoenvironmental assessment.

Selected Publications:

Briguglio, D., Kowalczyk, J., Stilwell, J.D., Hall, M. & Coffa, A. 2013. Detailed paleogeographic evolution of the Bass Basin: Late Cretaceous to present. *Australian Journal of Earth Sciences* **60**, 719-734.

- Foffa, D., Whiteside, D.I., Viegas, P.A. & Benton, M.J. 2014. Vertebrates from the Late Triassic Thecodontosaurus-bearing rocks of Durdham Down, Clifton (Bristol, UK). *Proceedings of the Geologists' Association* **125**, 317–328.
- Mays, C. (in press). A Late Cretaceous (Cenomanian–Turonian) south polar palynoflora from the Chatham Islands, New Zealand. *Memoirs of the Association of Australasian Palaeontologists*, **47**.
- Mays, C.M. & Stilwell, J.D. 2013. Pollen and spore biostratigraphy of the mid Cretaceous Tupuangi Formation, Chatham Islands, New Zealand. *Review of Palynology and Palaeobotany* **192**, 79–102.
- Mays, C., Tosolini, A.-M., Cantrill, D.J. & Stilwell, J.D. 2014. (in press). Late Cretaceous (Cenomanian–Turonian) macroflora from the Chatham Islands, New Zealand: Bryophytes, Lycophytes and Pteridophytes. *Gondwana Research*. <http://dx.doi.org/10.1016/j.gr.2014.03.017>.
- Quinney, A., Mays, C., Stilwell, J., Zelenitsky, D. & Therrien, F. (in press). The range of bioinclusions and pseudoinclusions preserved in a new Turonian (~90 Ma) amber deposit from southern Australia. *PLOS One*.
- Sorrentino-Mariconda, L., Stilwell, J.D. & Mays, C. 2014. A model of tephra dispersal from an early Palaeogene shallow submarine Surtseyan-style eruption(s), the Red Bluff Tuff Formation, Chatham Island, New Zealand. *Sedimentary Geology* **300** (2014), 86–102.
- Stilwell, J.D. 2014. Expansion of the rare trochid *Calliovarica* (Mollusca: Gastropoda) into eastern Zealandian waters during the late Paleocene-early Eocene thermal event. *Alcheringa* **38**, 239–244.
- Thompson, D.L., Stilwell, J.D. & Hall, W.M. (in press). Lacustrine carbonate reservoirs from Early Cretaceous rift lakes of Western Gondwana: Pre-Salt coquinas of Brazil and West Africa. *Gondwana Research*.
- Van den Berg, T., Whiteside, D.I., Viegas, P., Schouten, R. & Benton, M.J. 2012. The Late Triassic microvertebrate fauna of Tytherington. *Proceedings of the Geologists' Association* **123**(4) 638–648.
- Viegas, P.A. & Benton, M.J. 2014. The Bristol Dinosaur Project – A conservation and preparation overview. *Journal of Paleontological Techniques* **13**, 50–64.

Dr **Patricia Vickers-Rich** has again been heavily involved in IGCP project 587: Identity, Facies and Time – the Ediacaran (Vendian) Puzzle, of which she is a co-leader. This year several symposia and field workshops were organised, including: Yangtze Gorges, 2014 - A Symposium and Field Workshop on Ediacaran Subdivision and Correlation and Cryogenian Glaciations, held in Yichang, China, June 11–22, 2014. A Symposium on Neoproterozoic palaeobiology: preservation, palaeobiology, environments and phylogeny was held during the 4th International Palaeontological Congress (IPC) in Mendoza, Argentina 28 Sept. to 3 Oct. 2014. A Field workshop on the Nama Group of Namibia (May/June 2014) was held at Farm Aar in Namibia. Pat gave the Keynote address on “The importance of early childhood education in the earth sciences” to the 7th Conference of the African Association of Women in Geoscience, Windhoek, 3–9 Nov. 2014 at the Namibian Geological Survey, Windhoek.

Two major exhibitions were staged, one in Adelaide (a significant update to the Ediacaran Fossil Gallery “First Life”) and another in Singapore (Dinosaurs: Dawn to Extinction) at the ArtScience Museum which had an entire hall dedicated to the

Precambrian and Palaeozoic. Two smaller exhibitions were held in regional centres (Bathurst and Geelong), all highlighting research results of IGCP587.

Inspiring Australia Project: “Hidden National Treasure” Geotourism Training: 2012-2014. Under the *Inspiring Australia* program, a grant was awarded to develop geo-tourism skills for successful applicants with particular emphasis on the fossil assets of the Flinders Ranges. The project was managed by Damia Ettakadoumi and Chris Matthews of *Straight Up Science*, and included Certificate Training for tour guiding followed by a program, run by Jim Gehling and Chris Matthews, designed to highlight the geological treasures of the Cryogenian, Ediacaran and Cambrian rock formations in the central Flinders Ranges. The Flinders is one of 16 regions chosen for the Australia’s National Landscapes program, a tourism development and conservation partnership managed by Tourism Australia and Parks Australia.

National Heritage Listed Ediacara Fossil Site at Nilpena: More than 600 m² of fossiliferous beds have been excavated, inverted and re-assembled in stratigraphic series at Nilpena west of the Flinders Ranges in South Australia from 7 sites.

Travis Park is currently in the second year of his PhD which is investigating the hearing abilities of archaic toothed baleen whales. He is also continuing his research on Australian fossil penguins with one paper published this year and several nearing completion. He also communicates the latest palaeontological findings to the general public via social media and his blog, called Blogozoic, on the SciLogs blogging network.

- Fitzgerald, E.M.G., Park, T. & Worthy, T. 2012. First giant bony-toothed bird (Pelagornithidae) from Australia. *Journal of Vertebrate Palaeontology* **32**, 971–974.
- Park, T. 2012. Tracing the evolution of modern penguins (Aves: Spheniscidae) using fossils from Australia. Unpublished Honours thesis. 51 pp.
- Park, T. 2014. Redescription of the Miocene penguin *Pseudaptenodytes macraei* Simpson (Aves: Sphenisciformes) and redefinition of the taxonomic status of *?Pseudaptenodytes minor* Simpson. *Alcheringa* **38**, 450–454.
- Park, T. & Fitzgerald, E.M.G. 2012. A late Miocene–early Pliocene Mhirung bird (Aves:Dromornithidae) from Victoria, southeast Australia. *Alcheringa* **36**, 419–422.
- Park, T. & Fitzgerald, E.M.G. 2012. A review of Australian fossil penguins (Aves: Sphenisciformes). *Memoirs of Museum Victoria* **69**, 309–325

Deakin University, Burwood Campus (Melbourne)

Guang Shi continues his work on Late Palaeozoic brachiopod faunas, biostratigraphy, biogeography and extinction patterns, with ongoing active research collaborations with colleagues from Argentina, China, New Zealand, Russia and Taiwan. He has also recently initiated a research program on the macroevolution of Permian–Triassic marine invertebrate body sizes in relation to global warming and the end-Permian mass extinction.

- Cisterna G.A. & Shi G.R. 2014. Lower Permian brachiopods from Wasp Head Formation, Sydney Basin, southeast Australia. *Journal of Paleontology* **88**, 531–544.

- Haig, D.W., Martin, S.K., Mory, A.J., McLoughlin, S., Backhouse, J., Rodney, W., Berrell, R.W., Kear, B.P., Hall, R., Foster, C.B., Shi, G.R. & Bevan, J.C. 2015. Early Triassic (early Olenekian) life in the interior of East Gondwana: mixed marine–terrestrial biota from the Kockatea Shale, Western Australia. *Palaeogeography, Palaeoclimatology, Palaeoecology* **417**, 511–533.
- Haig, D.W., McCartain, E., Mory, A.J., Borgesm, G., Davydov, V.I., Dixon, M., Ernst, A., Groflin, S., Håkansson, E., Keep, M., Santos, Z.D., Shi, G.R. & Soares, J. 2014. Postglacial Early Permian (late Sakmarian–early Artinskian) shallow-marine carbonate deposition along a 2000 km transect from Timor to west Australia. *Palaeogeography, Palaeoclimatology, Palaeoecology* **409**, 180–204.
- He, W.H., Shi, G.R., Twitchett, R.J., Zhang, Y., Zhang, K.X., Song, H.J., Yue, M.L., Wu, S.B., Wu, H.T., Yang, T.L. & Xiao, Y.F. 2015. Late Permian marine ecosystem collapse began in deeper waters: evidence from brachiopod diversity and body size changes. *Geobiology* [In press, online version available: DOI: 10.1111/gbi.12119].
- He, W.H., Shi, G. R., Zhang, Y., Yang, T.L., Zhang, K.X., Wu, S.B., Niu, Z.J. & Zhang, Z.Y. 2014. Changhsingian (latest Permian) deep-water brachiopod fauna from South China. *Journal of Systematic Palaeontology* **12**, 907–960.
- Zhang, Y., Shi, G.R., He, W.H., Zhang, K.X. & Wu, H.T. 2014. A new Changhsingian (Late Permian) brachiopod fauna from Zhongzhai section (South China), Part 2: Lingulida, Orthida, Orthotetida, Spiriferida. *Alcheringa* **38**, 480–503.
- Zhang, Y.C., Shi, G.R., Shen, S.Z. & Yuan, D.X. 2014. Permian fusuline fauna from the Lower Part of the Lugu Formation in the central Qiangtang Block and its geological implications. *Acta Geologica Sinica* **88**, 365–379.
- Zhang, Y., Zhang, K.X., Shi, G.R., He, W.H., Yuan, D.X., Yue, M.L. & Yang, T.L. 2014. Restudy of conodont biostratigraphy of the Permian–Triassic boundary section in Zhongzhai, southwestern Guizhou Province, South China. *Journal of Asian Earth Sciences* **80**, 75–83.

Mark Warne has research interests in: (1) the systematic taxonomy of Cenozoic Ostracoda from Australia and the Southwest Pacific; (2) Late Miocene to early Pleistocene stratigraphy, sedimentology and ostracod faunal cycles of the Bass Strait hinterland, southeast Australia, and (3) Mid Holocene to Recent coastal palaeoenvironments and ostracod assemblages of the Warrnambool and Port Fairy districts, southeast Australia.

- Camilleri, T.A. & Warne, M.T. 2014 (online version). Preservation and assemblage characteristics of some ornate Lower Devonian Ostracoda from the Humevale Siltstone and Woori Yallock Formation, southeast Australia. *Alcheringa* [DOI: 10.1080/03115518.2014.951918].
- Poore, G.C.B., Avery, L., Błażewicz-Paszkowycz, M., Browne, J., Bruce, N.L., Dane, E., Gerken, S., Glasby, C., Staples, D., Syme, A., Taylor, J., Walker-Smith, G., Warne, M., Watson, C., Williams, A., Wilson, R.S. & Woolley, S. 2015 (online version). Invertebrate diversity of the unexplored marine western margin of Australia: taxonomy and implications for global biodiversity. *Marine Biodiversity* [DIO: 10.1007/s12526-014-0255-y].

Dr Nick Porch (ARC DECRA Fellow) continues his research into human impacts on island ecosystems in the Indo-Pacific. This research uses the recent fossil record of

plants and insects to contextualise the impact of both prehistoric and recent human arrival on island biodiversity. It is demonstrating that a wide range of insects were extirpated following human settlement regardless of whether this was in prehistory (Polynesia) or more recently (Mascarenes). Also there is ample evidence that humans translocated a large number of pest species including taxa that are ranked amongst the world's most destructive invasive insects.

Dr Elizabeth (Liz) Weldon is currently working on the taxonomy, biogeography and palaeoecology of Permian brachiopods, bivalves and conulariids, principally from the southern Sydney Basin, eastern Australia. Liz continues to teach 'History of Life' to a large cohort of first year students, and 'Biogeography' at second year level.

Currently Liz is supervising:

Shauna Stephens (Honours). Shauna is investigating the possible evolutionary influence of island isolation on the dentition of *Macropus rufogriseus* (co-supervisor with Dr Sanja Van Huet)

Kerry Wood (Summer Scholarship and Professional Practice). Kerry is assisting Liz with research on Australian Permian conulariids.

Roger Pierson maintains an interest in Gondwanan Permian palynology, and relict Permian landforms in Victoria, Australia.

Dr Sanja Van Huet is using features of the tarsometatarsus of extant and extinct *Dromaius* species to determine age groups biases in fossil bone accumulations. The following students are working on research projects under Sanja's supervision:

Maggie Coombs is determining evidence for sexual dimorphism in the tarsometatarsus of *Dromaius* sp.

Cameron McKenzie is reinvestigating the possible source and the depositional environment of the Lancefield megafaunal deposit at Lancefield, Victoria

Chris Dixon is investigating the environmental and depositional history associated with the discovery of an almost complete *Zygomaturus* skeleton at Diamond Bay, Sorrento.

Shauna Stephens is investigating the possible evolutionary influence of island isolation on the dentition of *Macropus rufogriseus* (with Liz Weldon)

Dr Sangmin Lee commenced his Research Fellow position at Deakin University in March 2014, and is working with Professor Guang Shi on a number of Permian palaeontology and global biogeography projects, with a particular focus on Permian marine faunas of the Arctic region.

Tamara Camilleri is completing her Masters by research degree under the supervision of Dr Mark Warne and Prof. Guang Shi at Deakin University and Dr David J. Holloway at Melbourne Museum. Tamara is currently working on the reclassification of Mid-Palaeozoic Ostracoda of Victoria, particularly the Fairy Bed Formation and the Norton Gully Sandstone in Eastern Victoria. Tamara has also recently reclassified the ostracod taxa found within the Humevale Siltstone and Woori Yallock Formation in the Lilydale, Chirnside Park area. The research also involves palaeoenvironmental and palaeoecological analysis.

Camilleri, T.T.A. & Warne, M.T. (in press). Preservation and assemblage characteristics of some ornate Lower Devonian Ostracoda from the Humevale Siltstone and Woori Yallock Formation, southeastern Australia. *Alcheringa* **39**.

Lisa Nink has just completed her Honours thesis entitled 'The Systematic Palaeontology of the Plio-Pleistocene Childers Cove Local Fauna, Victoria, Australia' under the supervision of Professor Guang Shi at Deakin University and Dr Thomas Rich at Museum Victoria. The Childers Cove Local Fauna consists mainly of marsupials and includes extinct megafaunal species such as *Thylacoleo* and *Zygomaturus*. The results of this study are currently being prepared for publication.

La Trobe University, Bendigo

John Neil (Honorary Research Associate) reports some spectacular results from a study of ostracodes from Miocene cave deposits at Riversleigh in western Queensland. With co-operation from Henk Godthelp and others involved in the Riversleigh project, I obtained some sample residue from the treatment of pitfall limestone to pick for ostracodes. A large assemblage was obtained, with 20-30 specimens showing signs of remarkably good soft part preservation. I sought assistance through the ostracod workers newsletter, since my background does not include soft part study.

Collaboration with a group at the European Synchrotron Radiation Facility over several years resulted in two publications, one an extensive taxonomic paper, and the other reporting the discovery of preserved 16 mya sexual organs and included sperm, as revealed by nanotomographic scans (a world first for the preservation of fossil sperm). The ESRF team was led by Dr Renate Matzke-Karas. The collaboration had extended over 7 years and included workers from Germany, Czech Republic and Japan.

I have now returned to taxonomic work, and studies of the ostracode assemblages from the Batesford Quarry collected originally by Dr Ken Bell.

Matzke-Karas, R., Neil, J.V., Smith, R.J., Godthelp, H., Archer, M. & Hand, S.J. 2013. Ostracods (Crustacea) with soft part preservation from Miocene cave deposits of the Riversleigh World Heritage Area, NW Queensland, Australia. *Journal of Systematic Palaeontology* **11**(7), 789-819.

Matzke-Karas, R., Neil, J.V., Smith, R.J., Symonová, R., Morkovský, L., Archer, M., Hand, S.J., Cloetens, P. & Tafforeau, P. 2014. Subcellular preservation in giant ostracod sperm from an early Miocene cave deposit in Australia. *Proceedings of the Royal Society B* **281** no. 1786 (2014), 20140394.

Museum Victoria, Melbourne

Tom Rich continues research on the late Early Cretaceous polar tetrapods of Victoria. Specifically, an Albian site near Cape Otway called Eric the Red West has now yielded two mammal specimens after six field seasons. This compared to a Barremian or Albian site called Flat Rocks near Inverloch that yielded 52 mammalian lower jaws in 20 field seasons but no upper molars. That bias has been dubbed "the Samson Effect" {for etymology, see Judges 15:15-16, *King James Bible*}. One of the

two mammalian specimens from Eric the Red West consists of two worn and broken upper molars. Poor quality though it is, that fossil does demonstrate the important fact that upper mammalian molars can occur at Eric the Red West. Hence the current emphasis on that site, because well preserved upper molars from there may resolve questions about the much disputed affinities of the mammalian family Ausktribosphenidae that more lower dentitions never will.

After having been submitted five times to three different journals over three years, finally in 2014 appeared in *Alcheringa* “*Serendipaceratops arthurcclarkei* Rich & Vickers-Rich, 2003 is an Australian Early Cretaceous ceratopsian”. Ceratopsians are a quite common and diverse group of dinosaurs in the Northern Hemisphere, particularly in eastern Asia and western North America. Northern Hemisphere reviewers of the manuscript were uncomfortable with accepting one isolated bone of the forearm, the ulna, as sufficient evidence that the group was also present in Australia.

Rolf Schmidt manages the Museum Victoria Invertebrate Palaeontology collection. All the Museum’s Palaeontology and Geology collections will move buildings in early 2016, and in the lead up to this, access to the collection may become more limited. Amongst Rolf’s projects is the photography (and potential 3D scanning) of MV type specimens, which will become part of our online collections database.

In time now freed up since handing over his AAP Treasurer role after more than 8 years, he is squeezing in some research on fossil bryozoans. Current focus is on the following:

- (1) The Cretaceous/Palaeogene transition in Australia and how the regional bryozoan faunas responded (testing the hypothesis that they were less affected by the K/T event than the northern hemisphere);
- (2) CT and Synchrotron scanning of bryozoans, with the potential to achieve (non-destructive) scans of Palaeozoic bryozoan fossils within artefacts from the UK in order to pinpoint their provenance;
- (3) Trawling through museum collections looking for encrusting bryozoans that have been catalogued according to their substrate taxon (e.g. bivalve), with a good chance of finding overlooked new species.

Rolf is also very busy organising the 17th International Bryozoology Conference, to be held in April 2016 at Melbourne Museum.

Western Australia

University of Western Australia

John Backhouse (University of Western Australia and Backhouse Biostrat Pty Ltd) is still an Honorary Research fellow at UWA and also maintains a low level of consulting work, now almost entirely for onshore hydrogeology investigations.

Research work has been on material from Timor Leste in conjunction with David Haig and others and more recently on the Perth Basin. His main research interest is a large project on the Late Carboniferous of the Canning Basin with Arthur Mory of the Geological Survey of WA.

David Haig, Senior Honorary Research Fellow in the Centre for Energy Geoscience (formerly Centre for Petroleum Geoscience and CO₂ Sequestration), School of Earth & Environment, continues to enjoy a very active retirement pursuing research interests in the late Paleozoic to Jurassic East Gondwana interior sag/rift, the Late Jurassic to Cenozoic west Australian passive margin, and the Timor collision.

[Consolidated Publications (2012-2014)].

- Benincasa, A., Keep, M. & Haig, D.W. 2012. A restraining bend in a young collisional margin: Mount Mundo Perdido, East Timor. *Australian Journal of Earth Sciences* **59**, 1-19.
- Davydov, V.I., Haig, D.W. & McCartain, E. 2013. A latest Carboniferous warming spike recorded by a fusulinid-rich bioherm in Timor Leste: Implications for East Gondwana deglaciation. *Palaeogeography, Palaeoclimatology, Palaeoecology* **376**, 22-38.
- Davydov, V.I., Haig, D.W. & McCartain, E. 2014. Latest Carboniferous (Late Gzhelian) fusulinids from Timor Leste and their paleobiogeographic affinities. *Journal of Paleontology* **88**, 588-605.
- Haig, D.W. 2012a. Palaeobathymetric gradients across Timor during 5.7-3.3 Ma (latest Miocene-Pliocene) and implications for collision uplift. *Palaeogeography, Palaeoclimatology, Palaeoecology* **331-332**, 50-59.
- Haig, D.W. 2012b. Stratigraphic reconstruction of Timor Leste. In Nogueira, P.M.M.P. (Ed.), *1st International Congress of Geology of Timor Leste, 16-20th January, 2012, Dili, Timor Leste*, pp. 59-62.
- Haig, D.W. & Bandini, A.N. 2013. Middle Jurassic Radiolaria from a siliceous argillite block in a structural melange zone near Viqueque, Timor Leste: Paleogeographic implications. *Journal of Asian Earth Sciences* **75**, 71-81.
- Haig, D.W., Martin, S.K., Mory, A.J., McLoughlin, S., Backhouse, J., Berrell, R.W., Kear, B.P., Hall, R., Foster, C.B., Shi, G.R. & Bevan, J.C. 2015. Early Triassic (early Olenekian) life in the interior of East Gondwana: mixed marine-terrestrial biota from the Kockatea Shale, Western Australia. *Palaeogeography, Palaeoclimatology, Palaeoecology* **417**, 511-533.
<http://dx.doi.org/10.1016/j.palaeo.2014.10.015>.
- Haig, D.W. & McCartain, E. 2012. Intraspecific variation in Triassic Ophthalmitid Foraminifera from Timor. *Revue de Microlaéontologie* **55**, 39-52.
- Haig, D.W., McCartain, E., Mory, A.J., Gilsel B., Davydov, V.I., Dixon, M., Ernst, A.J., Groflin, S., Håkansson, E., Keep, M., Dos Santos, Z., Shi, G.R. & Soares, J. 2014. Postglacial Early Permian (late Sakmarian-early Artinskian) shallow-marine carbonate deposition along a 2000 km transect from Timor to west Australia. *Palaeogeography, Palaeoclimatology, Palaeoecology* **409**, 180-204.
- Mory, A.J., Crowley, J., Nicoll, R.S., Metcalfe, I., Mantle, D., Mundil, R. & Backhouse, J. 2012. Wordian (Middle Permian) U-Pb CA-IDTIMS isotopic ages from the Lightjack Formation, Canning Basin, Western Australia. *Proceedings of the 34th International Geological Congress 2012. Brisbane, Australian Geosciences Council*, p. 3386.
- Ostragnay, D.B. & Haig, D.W. 2012. Foraminifera from microtidal rivers with large seasonal salinity variation, southwest Western Australia. *Journal of the Royal Society of Western Australia* **95**, 137-153.
- Taboada, A.C., Mory, A.J., Shi, G-R., Haig, D.W. & Pinilla, M.K. (in press). An Early Permian brachiopod-gastropod fauna from the Calytrix Formation, Barbwire Terrace, Canning Basin, Western Australia. *Alcheringa*.

Vachard, D., Haig, D.W. & Mory, A.J. 2014. Lower Carboniferous (middle Visean) foraminifers and algae from an interior sea, Southern Carnarvon Basin, Australia. *Geobios* **47**, 57–74.

Curtin University, Perth

Palaeontology Ancient Climates and Ecosystem (PACE) was launched on 28th March 2014 with a one-day symposium highlighting palaeontology research being undertaken in Western Australia and the different expertise that are available in the state. Currently the multidisciplinary teams research integrates the fields of sedimentology, palaeontology, ecology and geochemistry to investigate palaeoclimatic, evolutionary and environmental processes in order to reconstruct aspects of the Earth's past and better understand the complexities of the modern environment, patterns of biodiversity and the biosphere. This year members participated in AAPG Houston, ICP4 Mendoza and SVP Berlin.

Dr Milo Barham is a geologist whose research spans a broad field of sedimentology, palaeontology and geochemistry. Milo has been continuing work with B. Roelofs and K. Trinajstić examining Devonian microvertebrate and conodont assemblages from the Lennard Shelf, Canning Basin. In particular, investigating their O-isotope signatures with respect to interpreting palaeoenvironmental signals as well as palaeoecological, taphonomic and analytical controls. Milo, along with M. O'Leary, has been expanding his research in the Nullarbor Plains region into the Mesozoic sediment underlying the Eucla Basin to track the evolution of the southern margin of Australia in terms of depositional setting, sediment sourcing and crustal deformation. Milo obtained a number of small grants in 2014, including ~\$35k in Chevron SEED funding to attempt absolute dating of the Mungaroo Fm. (NW Shelf) to tie local stratigraphic (in particular biostratigraphic) schemes to an absolute timescale and resolve where biostratigraphy is impossible. During 2014, Milo took up a position on the Sub-commission for Western Australian Stratigraphy.

Dr Alison Blyth is a geochemist whose research focuses on the use of organic biomarkers, stable isotopes, and radiocarbon in fossils, sediments, and the modern environment to understand how environments and ecosystems respond to past and present natural and anthropogenic change. Current areas of interest include the use of stable isotopes in modern and fossil materials to interrogate and quantify changes in invertebrate and vertebrate food webs, primary sources, and environments. This work is leading to multiple collaborations, including with Dr Colin Smith of Latrobe University, Dr Milo Barham, and biologists and ecologists across a range of organisations. Other research themes include the use of biomarker compounds, and stable and radiocarbon isotopes to better understand the sources and transportation of organic matter in modern environments and Quaternary archives.

Dr Ross Edwards is an ultra-trace environmental chemist with expertise in 1) ice core glaciochemistry and palaeo-atmospheric records, 2) atmospheric chemistry, and 3) aquatic chemistry. His primary research focuses on the recent evolution of the atmosphere with respect to climate forcing and biogeochemical feedbacks. This research involves the chemical analysis of particles and soluble species in ice core records at concentrations down to the parts per quadrillion level. Edwards works in

collaboration with national and international partners to drill and analyse ice core records from Antarctica, Greenland, and China. Edwards leads the Curtin University TRACE facility – a unique cleanroom laboratory for contamination free sample preparation and analysis. The facility houses ice core analysis equipment, ancient DNA sample preparation laboratories (TreND group) as well as advanced instrumentation for ultra-trace analysis by high-resolution inductively coupled plasma, single particle intracavity laser induced incandescence and field flow fractionation. Automated systems for the ultra-clean extraction of elements from seawater is also housed in the facility.

Dr Aaron W. Hunter is a geologist and palaeontologist whose research centres on marine invertebrates, specifically echinoderm palaeoecology, and biostratigraphy. He is interested in both fossil and living organisms, establishing their evolutionary origins and their relation to animals in existence today. Echinoderms are a significant component of the marine biota and his research integrates biological and geological data to reconstruct the palaeobiogeography and palaeoecology of the ancient oceans to understand the evolutionary biology behind the origin of complex life in the deep time marine realm. Aaron uses marine fossils as both bioindicators and biofacies indicators within sedimentary facies, asking important questions about changing marine biodiversity through time in response to major events such as marine revolutions or mass extinctions. These palaeo-data are correlated with the organism responses which occur under modern oceanic conditions. Aaron has an extensive global collaborative research network and his current research is based in South-East Asia and Australia.

Dr Michael O’Leary is a marine geoscientist with expertise in the fields of: 1) tropical coastal geomorphology, 2) coral reef and reef-island evolution, and 3) sea level rise and climate change. His primary research seeks to better understand the ecologic and geomorphic responses of tropical coastal environments to rising sea levels and global environmental change. O’Leary combines high precision GPS and GIS technologies and advanced field mapping to understand past sea level changes and the tectonic and geomorphic evolution of continental margins. He is a lead investigator on WAMSI’s Kimberley Marine Research Node (Reef Growth and Maintenance):1.3.1 Reef geomorphology, Holocene growth history and impacts for climate change. Other projects include an investigation of the evolution of the southern margin of Australia (principally the Bight and Eucla Basins) with the aim of gaining a better understanding of ancient ocean temperatures, currents, faunal provinces, sea level etc. in collaboration with Barham and Dr Nick Timms, Curtin University as well as the Geological Survey of Western Australia.

A/Professor Kate Trinajstić is a palaeontologist with expertise in the fields of: 1) reef evolution, 2) taphonomy in the area of exceptional preservation, 3) morphological changes in early vertebrate (placoderms) through time and 4) microvertebrate and conodont biostratigraphy. Her primary research seeks to understand the timing, anatomical and phylogenetic significance of when specialized sense organs, sexual dimorphism and diverse reproductive structures first evolved in fish, abilities which today allow high diversity in a small geographic range. Kate continues to use synchrotron-radiation and X-ray tomographic microscopy to provide detailed information on the morphology and environment of both modern and ancient fishes and has recently started using the Australian Synchrotron. Currently Kate is the

recipient of a QE11 Fellowship and an ARC DP led by Dr John Long (Flinders University).

Post Graduate Students

Charlotte Mack is continuing a PhD researching the palynology of the Mulga Rock uranium deposits in the southern Officer Basin for her PhD thesis titled “Palynology and stratigraphy of the southern Officer Basin and the implications for southern Australian biostratigraphy and palaeovegetation”. The project is supervised by Dr Lynne Milne and Associate Professor Kate Trinajstić also from Curtin University. Pollen and spore assemblages from Mulga Rocks have been dated as Late Eocene (Murray Basin equivalent of the Middle *Nothofagidites asperus* Zone). An unusually high percentage of affiliates of Myrtaceae (e.g. eucalypts) have been recognised and fossil pollen species have been identified in assemblages from Mulga Rock that can be aligned with modern species representative of scleromorphic and xeromorphic vegetation. These modern species occupy heath, woodland and/or dry sclerophyll forests today and may indicate that the vegetation may have been more fire-prone and occupied a drier environment. This research will make a significant contribution to knowledge of sclerophylly and xeromorphy in Australia.

Brett Roelofs is currently working on Late Devonian placoderms as well as conodont and microvertebrate remains from the Late Devonian and Early Carboniferous in the Canning Basin of Western Australia. New placoderm discoveries from the Givetian and Famennian, in the Mid-Late Devonian, are providing new data on the distribution and origin of placoderms within the basin. Continued investigation into microvertebrates is allowing a more refined biostratigraphy for the Famennian (Late Devonian) in the Canning Basin. In addition a largely undescribed microvertebrate fauna from the Tournaisian (Early Carboniferous) is currently under investigation. A continued faunal relationship, from the Late Devonian to the Early Carboniferous, is becoming further confirmed between shark faunas in the Canning Basin and other areas of Northern Gondwana. In addition, to better understand palaeoclimates and the potential drivers of extinctions in the Late Devonian and Early Carboniferous, oxygen isotopes from biogenic apatite are currently being employed. Importantly, a range of taxa (fish and conodonts) are under analyses to better determine the effects of diagenesis and potential isotopic fractionation between groups.

Rodney Berrell has commenced a PhD looking at the late Mesozoic fossil fishes from the Eromanga Basin in order to determine faunal diversity, population dynamics, and evolution of the taxa as the basin is transformed from shallow marine to terrestrial depositional environments over a period of ~ 10 million years. A primary aim of this study is to look at microvertebrate material. To date the described Mesozoic fish remains from the Eromanga Basin are limited to fishes with a body size in excess of 1m in length. It is currently unknown if this is a taphonomic or sampling effect. There is a wealth of microvertebrate material known but unstudied suggesting that the lack of data is the result of under-sampling. The fish taxa known include chondrichthyans, actinopterygians and the dipnoans. Out of the ~25 described taxa, only 4 of these are found in freshwater sediments.

[Selected Group Publications]

- Barham, M., Murray, J., Sevastopulo, G.D. & Williams, D.M. (in press). Conodonts of the genus *Lochriea* in Ireland and the recognition of the Viséan-Serpukhovian (Carboniferous) boundary. *Lethaia* doi:/10.1111/let.12096.
- Barham, M. (in press). Fossils explained: Comprehending conodonts. *Geology Today*.
- Blyth, A.J., Jex, C.N, Baker, A., Khan, S.J. & Schouten, S. 2014. Contrasting distributions of glycerol dialkyl glycerol tetraethers (GDGTs) in speleothems and associated soils. *Organic Geochemistry* **69**, 1-10.
- George, A.D., Chow, N. & Trinajstić, K. 2014. Oxidic facies and the Late Devonian mass extinction, Canning Basin, Australia. *Geology* **42**, 327-330.
- Hairapetian, V., Roelofs, B., Trinajstić, K. & Turner, S. (in press). Famennian survivor turiniid thelodonts of North and East Gondwana. *Geological Society Special Publication*.
- Hansma, J., Tohver, E., Yan, M., Trinajstić, K., Roelofs, B., Peek, S., Slitznick, S.P., Kirschvink, J., Playton, J., Haines, P. & Hocking, R. 2015. Late Devonian carbonate magnetostratigraphy from the Oscar and Horse Spring Ranges, Lennard Shelf, Canning Basin, Western Australia. *Earth and Planetary Science Letters* **409**, 232-242.
- Haig, D.W., Martin, S.K., Mory, A.J., McLoughlin, S., Backhouse, J., Berrell, R.W., Kear, B.P., Hall, R., Foster, C.B., Shi, G.R. & Bevan, J.C. 2015. Early Triassic (early Olenekian) life in the interior of East Gondwana: mixed marine-terrestrial biota from the Kockatea Shale, Western Australia. *Palaeogeography, Palaeoclimatology, Palaeoecology* **417**, 511-533.
<http://dx.doi.org/10.1016/j.palaeo.2014.10.015>.
- Johanson, Z. & Trinajstić, K. 2014. Fossilized ontogenies: The contribution of placoderm ontogeny to our understanding of the evolution of early gnathostomes. *Palaeontology* **57**(3), 505-516.
- Long, J.A., Mark-Kurik, E., Johanson, Z., Lee, M.S.Y., Young, G.C., Min, Z., Ahlberg, P.E., Newman, M., Jones, R. Blaauwen, J.-d., Choo, B. & Trinajstić, K. 2014. Copulation in antiarch placoderms and the origin of gnathostome internal fertilization. *Nature* doi:10.1038/nature13825
- Murray, J., Lynch, E.P., Domínguez-Alonso, P. & Barham, M. (in press). Stratigraphy and sedimentology of Azokh Cave, in Fernandez-Jalvo, Y., Andrews, P., King, T. & Yepiskoposyan, L. (eds.), *Azokh Cave and the Transcaucasian Corridor* [forthcoming volume of the Vertebrate Paleobiology and Paleoanthropology Springer Book Series edited by E. Delson and E. Sargis].
- Rovere, A., Raymo, M.E., Mitrovica, J.X., Hearty, P.J., O'Leary, M.J. & Inglis, J.D. 2014. The Mid-Pliocene sea-level conundrum: Glacial isostasy, eustasy and dynamic topography. *Earth and Planetary Science Letters* **387**, 27-33.
- Sevastopulo, G.D. & Barham, M. 2014. Correlation of the base of the Serpukhovian Stage (Carboniferous; Mississippian) in northwest Europe. *Geological Magazine* **151**, 244-253.
- Trinajstić, K., Roelofs, B., Burrow, C.J., Long, J.A. & Turner, S. 2014. Devonian vertebrates from the Canning and Carnarvon Basins with an overview of Paleozoic vertebrates of Western Australia. *Journal of the Royal Society of Western Australia* **97**, 133-151.
- Trinajstić, K., Boisvert, C., Long, J.A., Maksimenko, A. & Johanson, Z. 2014. Pelvic and reproductive structures in placoderms (stem gnathostomes). *Biological Reviews*. DOI: 10.1111/brv.12118.

Geological Survey of Western Australia, Department of Mines and Petroleum

The GSWA Paleontology Collection remains open to all researchers, both within Australia and internationally. Recent work has included an ongoing project to digitise the collection's catalogue, and attempts to recover past (and often very overdue!) loans made by GSWA to various Australian institutions. Any information or queries regarding potential Survey samples (generally numbered with a F- prefix) is most welcome — contact Sarah Martin.

Plans are also underway to make all of GSWA's historic informal paleontology reports available online, including a set of period summaries (akin to GSWA Bulletin 136 'Palaeontology of the Permian of Western Australia', but covering the individual periods from the Precambrian to Quaternary) collated in the late 1980s and early 1990s.

All GSWA publications (>100 years' worth) are available for free from www.dmp.wa.gov.au/gswapublications — just type in appropriate search criteria. Use the DOWNLOAD button to obtain a pdf file (to download, print, or both). For posters, change the cabinet (top right) from 'GSWA Geoscience Products' to 'GSWA Posters and Flyers'.

Heidi-Jane Allen (Basins & Energy Group) is working on Neoproterozoic biostratigraphy of the Amadeus Basin — in collaboration with Kath Grey and Peter Haines — with an aim to expand this to a greater Centralian Superbasin project in the coming year. Heidi is also working on Palaeozoic (Ordovician–Devonian) biostratigraphy of the Canning and Carnarvon Basins in collaboration with Kate Trinajstić (Curtin University) and is part of a working group on the Eucla Basin in collaboration with Curtin University.

- Allen, H-J., Grey, K. & Haines, P.W. 2012. Neoproterozoic stromatolite biostratigraphy in the western Amadeus, *in* Central Australian Basin Symposium III, (G.J. Ambrose & J. Scott, eds). Petroleum Exploration Society of Australia, Special Publication, CD-ROM, 11p.
- Allen, H-J., Grey, K. & Haines, P.W. 2012. Stromatolite biostratigraphy in the western Amadeus Basin: Proceedings of the 34th International Geological Congress (34IGC), Brisbane, 5–10 August, Abstracts, p. 1307.
- Grey, K., Allen, H-J., Hill, A. & Haines, P.W. 2012. Neoproterozoic biostratigraphy of the Amadeus Basin, *in* Central Australian Basin Symposium III, (G.J. Ambrose & J. Scott, eds). Petroleum Exploration Society of Australia, Special Publication, CD-ROM, 18p.
- Haines, P.W. & Allen, H-J. 2014. Geology of the Boord Ridges and Gordon Hills: Key Stratigraphic Section in the Western Amadeus Basin, Western Australia. *GSWA Record* **2014/11**, 21p.
- Haines, P.W., Allen, H-J., Grey, K. & Edgoose, C. 2012. The western Amadeus Basin: revised stratigraphy and correlations, *in* Central Australian Basin Symposium III (G.J. Ambrose & J. Scott, eds). Petroleum Exploration Society of Australia, Special Publication, CD-ROM, 6p.
- Haines, P.W., Allen, H-J., Wingate, M.T.D., Kirkland, C.L. & Edgoose, C. 2012. Syntectonic (Petermann Orogeny) deposition tracked through detrital zircon geochronology, western Amadeus Basin, central Australia: Proceedings of the 34th International Geological Congress (34IGC), Brisbane, 5–10 August, Abstracts, p. 1091.

- Haines, P.W., Allen, H-J., Wingate, M.T.D., Kirkland, C.L. & Hocking, R.M. 2011. Ice movement direction and detrital zircon provenance data for early Permian glacial deposits, Amadeus Basin, eastern Western Australia: Abstracts, XVII International Congress on the Carboniferous and Permian, Perth, 3–8 July, p. 63.
- Hocking, R., Haines, P. & Allen, H-J. 2014. The Devonian Reef Complexes of the Canning Basin in Context: Subsurface and Adjacent Basins: AAPG Annual Conference and Exhibition 2014, Houston, TX, April 6 – 9, 2014, Abstracts.

Kath Grey (Consultant paleontologist) is enjoying retirement but is still maintaining an interest in scientific studies. She is working on both the stromatolites and palynology of the Amadeus Basin, focussing mainly on the western part of the basin currently being re-assessed by Peter Haines and Heidi Allen. Kath also continues her interests in older Proterozoic and Archean acritarchs and stromatolites, including a project on Mesoproterozoic stromatolites from the North Australian Craton in conjunction with GSWA mapping geologist Chris Phillips. The text for a handbook for the study and description of stromatolites and other microbialites with Stan Awramik is nearly complete and the focus is now on selecting appropriate illustrations. Input to the GSWA fossil databases also continues.

Sarah Martin (Basins & Energy Group) took over management of GSWA's paleontology collection in 2012 and is the primary contact for matters relating to this collection. She is also part of a Survey team reassessing the stratigraphy of the Southern Perth Basin, and is presently focussed on reviewing the biostratigraphy of this region.

Sarah also continues to work on Mesozoic insects, including: finalising publication of her PhD research on Early Jurassic insects from Western Australia; continuing work on the Early Cretaceous Koonwarra insect assemblage of Victoria (in association with Monash University); and commencing research on insects from the Lower Triassic Kockatea Formation (in association with UWA).

- Haig, D.W., Martin, S.K., Mory, A.J., McLoughlin, S., Backhouse, J., Berrell, R.W., Kear, B.P., Hall, R., Foster, C.B., Shi, G.R. & Bevan, J.C. 2015. Early Triassic (early Olenekian) life in the interior of East Gondwana: mixed marine-terrestrial biota from the Kockatea Shale, Western Australia. *Palaeogeography, Palaeoclimatology, Palaeoecology* **417**, 511-533. doi:10.1016/j.palaeo.2014.10.015.
- McLoughlin, S., Martin, S.K. & Beattie, R. (in press). The record of Australian plant–arthropod interactions. *Gondwana Research* doi: 10.1016/j.gr.2013.11.009.

Tony Cockbain (South Perth, WA) has finally retired from editing the RSWA Journal with his swan song being the Centennial Issue 'Celebrating 100 years of the Royal Society of Western Australia—Promoting Science in Western Australia: a review of some achievements'. While the 17 papers cover a wide spectrum of science, several will be of particular interest to palaeontologists: trace fossils from the Tumblagooda Sandstone; Devonian vertebrates from the Canning and Carnarvon Basins; and stromatolite research in Shark Bay. I have also been involved in the GSWA's project 'Western Australia unearthed' (a series of volumes that chronicle the geological evolution of Western Australia) in the writing of 'Australia goes it alone'.

- Cockbain, A.E. 2014. *Australia goes it alone—the emerging island continent 100 Ma to present*. Geological Survey of Western Australia, Perth.

Cockbain, A.E. 2014. Preface. Promoting science in Western Australia, a review of some achievements. *WA Science—Journal of the Royal Society of Western Australia* **97**, iii-v.

V & C Semeniuk Research Group, Warwick, WA.

Over the past year, **Vic Semeniuk**, in collaboration with Chris Semeniuk, Joy Unno, and Penelope Clifford, within the V & C Semeniuk Research Group, continued to research in Western Australia Quaternary stratigraphic sequences, their fauna and flora, and their taphonomy along the coast and in wetlands, and develop Holocene and Pleistocene models for interpreting ancient sequences and climate and palaeoecology. In collaboration with Ian Percival and Barry Webby, Vic continues investigations into Ordovician limestones with the objective to reconstruct their palaeoenvironments and palaeoecology at Bowan Park and Cliefden Caves. In collaboration with Barry Webby, Vic is continuing investigations into the ultrastructure of stromatoporoids, their diagenesis, and the interactions between stromatoporoid and enclosing sediments. Recently, Joy Unno and Vic published a paper on the complex ichnology of a tidal flat crustacean in Western Australia that is also preserved as ichnofossils in the indurated middle Holocene carbonate sediments.

Semeniuk, V. & Unno, J. 2014. Complex ichnology of the Western Australian soldier crab *Mictyris occidentalis* Unno 2008 (Brachyura: Mictyridae) - the 'Rosetta Stone' to interpreting population age structure and age-related behaviour. *Ichnos* **21**, 44–61.

NEW ZEALAND

Institute of Geological & Nuclear Sciences, Lower Hutt

Highlights and news from the Paleontology team at GNS Science

Paleogene climate and biostratigraphic research

Fossil- and geochemistry-based climate reconstructions of the Paleogene of the SW Pacific (Pancost et al., 2013; Taylor et al., 2013; Contreras et al., 2013) are beginning to fall in line with reconstructions based on climate models (Hollis et al., 2012), giving some confidence in the capacity of models to predict the regional impacts of global warming.

Major advances have been made in the calibration and interpretation of climatic events in the early Cenozoic, further clarifying the links between global climatic events and a more energetic hydrological cycle in New Zealand (Slotnick et al., 2014), including the first-ever magnetostratigraphic calibration of Paleogene strata in New Zealand (Dallanave et al., 2014, in review).

A new Paleocene dinoflagellate zonation has been produced that provides a refined subdivision for a time period of interest for both petroleum exploration and paleoclimate research (Crouch et al., 2014), and a significant cooling event in the late Paleocene has been identified that is inferred to be linked to ice sheet growth in

Antarctica (Hollis et al., 2014). A serendipitous outcome of this latter study has been improved understanding of the conditions that led to deposition of a widespread petroleum source rock.

The IPCC Assessment Report 5 Working Group 1 report includes results of Eocene research generated by GNS paleontologists and collaborators in the context of a summary prepared by Chris Hollis.

Cretaceous biostratigraphy

A new dinoflagellates cyst zonation for the Arowhanan Stage (late Cenomanian) fills an age gap in the dinoflagellate biostratigraphy and will aid in petroleum exploration of Late Cretaceous source rocks (Schiøler & Crampton, 2014). On-going work aims to link this new Arowhanan zonation with the existing Piripauan-Haumurian (Santonian-Maastrichtian) dinoflagellate zonation. Biostratigraphic work in the Arowhanan has informed, and benefitted from, recent identification of the Cenomanian-Turonian boundary carbon isotope event in New Zealand (Hasegawa et al., 2013). Study of this boundary, and associated oceanographic and anoxic events, will continue with a study of uranium isotopes, a project led by Claudine Stirling at Otago University and involving James Crampton and Hugh Jenkyns (Oxford University).

IODP

GNS paleontologists have continued to play a lead role in promoting New Zealand's participation in the International Ocean Discovery Program (IODP), through the Australian and New Zealand IODP Consortium (ANZIC). Chris Hollis stepped down as chair of NZ committee and NZ representative on the ANZIC council, having succeeded in securing NZ's membership in the next phase of IODP, which includes several New Zealand-led proposals that are likely to result in JOIDES Resolution expeditions in 2017 and 2018. He is replaced by Stuart Henrys. Giuseppe Cortese continues as national coordinator.

New Zealand Fossil Record File

James Crampton attended a workshop in Washington DC in May 2014 to discuss the global integration of paleobiological data from the full array of cyberinfrastructure resources, with an emphasis on sample-based information. James was invited to attend in recognition of the importance of the Fossil Record Electronic database (FRED). The workshop was an important step towards the implementation of international best-practice in FRED, and the development of interoperability between FRED and other international databases. After discussions and analysis lasting over a year, we are close to having an automated protocol for designating 'Adopted Age' in FRED, as a solution to a major problem in the recording and extraction of meaningful geological ages; this protocol will be implemented in the coming year. At the same time, we have initiated a review of the FRED database that will help to inform any redevelopment of the database in the face of growing technical debt, and growing needs and expectations of the user community.

Macropaleontology

The first well-preserved Cretaceous freshwater Mollusca recorded from New Zealand has been described, including a new genus and species of gastropod and elements of

the Gondwana biota that survive elsewhere but are now extinct in New Zealand, and others which have a record to the present day (Beu et al., 2014).

Resolution of a long-standing debate about whether the fossil record is pervasively and profoundly biased by loss of aragonite shells (relative to calcitic shells), or not, is at hand. The bias is shown to be essentially non-existent in siliciclastic, but large in carbonate environments – no-one has documented this contrast previously.

Importantly, it is also demonstrated that the bias in carbonate environments reflects both dissolution of aragonitic shells (taphonomic loss) but also an original ecological preference of calcitic taxa for these environments; the ecological and taphonomic effects are of about the same magnitude (Foote, Crampton et al., in press in *Paleobiology*).

Quaternary temperatures and modern analogue data

Foraminifera-based sea surface temperature estimates for the Last Interglacial (Marine Isotope Stage 5e) reveal ocean conditions around NZ during a time interval of slightly warmer than present climate (Cortese et al., 2013), and suggest expanded influence of the East Australian Current and associated eddies, warming the western Tasman Sea and offshore south-eastern New Zealand more than other regions.

For the first time, a review of marine paleoclimate/paleotemperature records for the Australian-NZ Sector of the Southern Ocean over past 30 ka has been completed (Bostock et al., 2013).

A modern reference dataset for dinoflagellates in the SW Pacific has been established, and data from two sediment trap moorings has been reported on (Prebble et al., 2013a, b).

A calibration dataset for the leaf morphology-based paleoclimate method CLAMP (Climate Leaf Analysis Multivariate Program) was published for the Southern Hemisphere; previous calibrations have mostly focussed on the Northern Hemisphere or are regionally specific calibrations (Kennedy et al., 2014).

Honours

James Crampton was elected to Vice-President (one of five) of the International Palaeontological Association at the 4th International Palaeontological Congress in Mendoza, Argentina, in October 2014.

Marianna Terezow was awarded the Kingma Award at the 2013 NZ Geosciences conference for her outstanding contribution in the form of co-authored publications, collection-curation work and outreach.

Collections

Over the course of the year, more than 25 scientists, representing 9 countries, have visited the National Paleontology Collection at GNS Science. John Simes and Marianna Terezow have responded to remote requests for images, casts, or metadata and have lodged specimens in the collections for researchers based elsewhere.

Events

The Dinosaur Footprints touring exhibition was launched in June 2014, with substantial input from Greg Browne, Marianna Terezow, John Simes, Lucia Roncaglia and Hamish Campbell. This exhibition showcases New Zealand's only

known dinosaur footprints which were found in Late Cretaceous tidal sediments from Northwest Nelson. The exhibition will tour about 10 New Zealand venues until 2016.

The Quaternary Techniques workshop was held in May 2014, this is the 11th year of this highly successful workshop hosted at GNS and attracted its largest attendance to date, with 53 participants from New Zealand and overseas universities.

Te Kura Whenua camp: GNS Science and Ngati Kahungunu Iwi Incorporated (NKII) held their second Earth science wananga over three days at Putahi Marae in Frasertown, Wairoa. There was a very wide range of participants from senior kaumatua and rangatira within the iwi to numerous emerging leaders. We also encouraged participation by rangatahi, youth, who benefitted greatly from the experience. Feedback was extremely positive. The GNS team included Richard Levy, Chris Hollis and PhD student Kristina Pascher from the Paleontology Department as well as Fiona Coyle, Rawiri Faulkner, Diane Bradshaw and. Kyle Bland.

Funding proposals

GNS paleontologists have also participated fully in the development of proposals to address four of the New Zealand government-initiated National Science Challenges: Deep South, Sustainable Seas, Land and Water and Biological Heritage.

Dallas Mildenhall (co-Principal Investigator) and Liz Kennedy (Associate Investigator) will be working on a new Marsden-funded project entitled ‘Captured in amber: ecological complexity in New Zealand's ancient araucarian forests’. This 3-year project led by Daphne Lee from Otago University (co-Principal Investigator) aims to gain insights into life preserved in New Zealand fossil amber over the last 80 million years.

Marcus Vandergoes is an Associate Investigator on a new Marsden-funded Fast Start project entitled: “The terrestrial carbon cycle in transition: tracking changes using novel tracers on multiple timescales”. The Principal Investigator is A. Harland (Waikato University).

Individual reports

Ian Raine Main activities since the last report in *Nomen nudum* have been in palynological consulting work for petroleum exploration in the Taranaki Basin, and continuing research into a more detailed NZ Late Cretaceous miospore zonation, pollen analysis of NZ honeys, NZ Early Eocene vegetation and paleoclimate, and with Vivi Vajda (Lund University) on the K/T boundary.

Roger Cooper is currently using the CONOP (Constrained optimisation) method and database to analyse the extinction dynamics and survivorship of Ordovician and Silurian graptolites, with James Crampton (GNS Science), Mike Foote (Univ. Chicago) and Pete Sadler (UCLA Riverside). With Jim Jago and Chris Bentley (Adelaide), the last of the major trilobite faunas collected during our expeditions to Northern Victoria Land (1974, 1981) are being described. Various contributions for the Graptolite Online Treatise are in preparation or have been completed.

Student news

Matt Ryan is completing his PhD on Quaternary climate change (Victoria University of Wellington - VUW), co-supervised by Marcus Vandergoes.

Heidi Roop is completing her PhD on Holocene climate change (VUW), co-supervised by Richard Levy and Marcus Vandergoes.

Kristina Pascher, Claire Shepherd, both co-supervised by Hollis (Cortese co-supervisor for Pascher; Crampton co-supervisor for Shepherd), began PhD projects at VUW on Paleogene micropaleontology and paleoclimate.

Sina Panitz (U. Potsdam) completed her MSc thesis on applying a modern radiolaria dataset to core Y9 (co-supervised by Giuseppe Cortese).

Tammo Reichgelt (University of Otago) is completing his PhD on NZ Miocene climate and ecosystems from plant fossils (co-supervised by Liz Kennedy).

The Paleontology Department has recently purchased a desktop SEM, an exciting addition to our research tools and several staff will be trained to operate it in the near future.

Selected publications 2013- 2014 (consolidated listing)

Barrell, D.J.A., Almond, P.C., Vandergoes, M.J., Lowe, D.J. & Newnham, R.M.

2013. A composite pollen-based stratotype for inter-regional evaluation of climatic events in New Zealand over the past 30,000 years (NZ-INTIMATE project). *Quaternary Science Reviews* **74**, 4-20.

Beu, A.G., Marshall, B. & Reay, M.B. 2014. Mid-Cretaceous (Albian-Cenomanian) freshwater Mollusca from the Clarence Valley, Marlborough, NZ, and their biogeographical significance. *Cretaceous Research* **49**, 134-151.

Bostock, H.C., Barrows, T.T., Carter, L., Chase, Z., Cortese, G., Dunbar, G.B., Ellwood, M., Hayward, B., Howard, W., Neil, H.L., Noble, T.L., Mackintosh, A., Moss, P.T., Moy, A.D., White, D., Williams, M.J.M. & Armand, L.K. 2013. A review of the Australian-New Zealand sector of the Southern Ocean over the last 30 ka (Aus-INTIMATE project). *Quaternary Science Reviews* **74**, 35-57.

Boyle, J.T., Sheets, H.D., Wu, S.-Y., Goldman, D., Melchin, M.J., Cooper, R.A., Sadler, P.M. & Mitchell, C.E. 2013. A re-examination of the contributions of biofacies and geographic range to extinction risk in Ordovician graptolites. *GFF* **136**(1), 38-41. DOI: 10.1080/11035897.2013.861864

Collins, K.S., Crampton, J.S. & Hannah, M. (In press). Stratocladistic analysis and taxonomic revision of the character-poor New Zealand crassatellid bivalves *Spissatella* and *Eucrassatella*. *Journal of Molluscan Studies*.

Conran, J.G., Mildenhall, D.C., Lee, D.E., Lindqvist, J.K., Shepherd, C., Beu, A.G., Bannister, J.M. & Stein, J.K. 2014. Subtropical rainforest vegetation from Cosy Dell, Southland: plant fossil evidence for Late Oligocene terrestrial ecosystems. *New Zealand Journal of Geology and Geophysics*, on-line, doi: 10.1080/00288306.2014.888357.

Contreras, L., Pross, J., van de Schootbrugge, B., Bijl, P.K., Raine, J.I., Koutsodendris, A. & Brinkhuis, H. 2013. Early to Middle Eocene vegetation dynamics at the Wilkes Land Margin (Antarctica). *Review of Paleobotany and Palynology* **197**, 119-142.

Contreras, L., Pross, J., Bijl, P.K., O'Hara, R.B., Raine, J.I., Sluijs, A. & Brinkhuis, H. 2014. Southern high-latitude terrestrial climate change during the Paleocene–Eocene derived from a marine pollen record (ODP Site 1172, East Tasman Plateau). *Climates of the Past Discussions* **10**, 291-340.

Cook, C.P., Hill, D., van de Flierdt, T., Williams, T., Hemming, S.R., Dolan, A.M., Pierce, E.L., Escutia, C.D., Harwood, D., Cortese, G. & Gonzalez, J.J. 2014. Sea surface temperature control on the distribution of far-travelled Southern Ocean

- ice-rafted detritus during the Pliocene. *Paleoceanography* **29**.
doi:10.1002/2014PA002625
- Cooper, R.A., Sadler, P.M., Munnecke, A. & Crampton, J.S. 2014 [2013]. Graptoloid evolutionary rates track Ordovician-Silurian global climate change. *Geological Magazine* **151**, 349-364.
- Cortese, G. 2014. Radiolarian researchers based in Italy during the late nineteenth and early twentieth centuries. *Journal of Micropalaeontology* **33**(1), 95–103.
doi:10.1144/jmpaleo2012-023
- Cortese, G., Dunbar, G.B., Carter, L., Scott, G.H., Bostock, H., Bowen, M. & Crundwell, M.P. 2013. Southwest Pacific Ocean response to a warmer world: insights from Marine Isotope Stage 5e. *Paleoceanography* **28**, 1-14.
doi:10.1002/palo.20052
- Crame, J.A., Beu, A.G., Ineson, J.R., Francis, J.E., Whittle, R.J. & Bowman, V.C. (in press). The early origin of the Antarctic marine fauna and its evolutionary implications. *PLoS ONE*.
- Crouch, E.M., Willumsen, P.S., Kulhanek, D. & Gibbs, S. 2014. A revised Paleocene (Teurian) dinoflagellate cyst zonation from eastern New Zealand. *Review of Palaeobotany and Palynology* **202**, 47-79.
- Dallanave, E., Bachtadse, V., Agnini, C., Muttoni, G., Hollis, C.J., Hines, B.R., Morgans, H.E.G., Strong, C.P., Tauxe, L. & Crampton, J.S. 2014. Early-middle Eocene magneto-biochronology of the Southern Pacific Ocean: new data from the South Island of New Zealand. *Rendiconti Online* 31, 50-51 [CBEP 2014 Conference Proceedings].
- Golledge, N.R., Menviel, L., Carter, L., Fogwill, C.J., England, M.H. & Cortese, G. Antarctic meltwater pulse 1A from a positive ice-ocean feedback mechanism. *Nature Communications*. (accepted August 2014).
- Hasegawa, T., Crampton, J., Schiøler, P., Field, B. & Fukushi, K. 2013. Carbon isotope stratigraphy and inferred ocean oxia through Cenomanian-Turonian boundary (Upper Cretaceous) sequences in New Zealand. *Cretaceous Research* **40**, 61-80.
- Hines, B.R., Kulhanek, D.K., Hollis, C.J., Atkins, C.B. & Morgans, H.E.G. 2013. Paleocene–Eocene Stratigraphy and Paleoenvironment at Tora, southeast Wairarapa, New Zealand. *New Zealand Journal of Geology and Geophysics* **56**, 243-262.
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- Kennedy, E.M., Arens, N.C., Reichgelt, T., Spicer, R.A., Spicer, T.E.V., Stranks, L. & Yang, J. 2014. Deriving temperature estimates from Southern Hemisphere leaves. *Palaeogeography, Palaeoclimatology, Palaeoecology* **412**, 80-90.
- Lee, D.E., Lindqvist, J.K., Beu, A.G., Robinson, J.H., Ayress, M.A., Morgans, H.E.G. & Stein, J.K. 2014. Geological setting and diverse fauna of a Late Oligocene rocky shore ecosystem, Cosy Dell, Southland. *New Zealand Journal of Geology and Geophysics*, on-line, doi: 10.1080/00288306.2014.898666.

- Maletz, J., Bates, D., Brussa, E.D., Cooper, R.A., Lenz, A.C., Riva, J.F., Toro, B.A. & Zhang, Y-D. 2014. Chapter 12: Glossary of the Hemichordata, in *Treatise on Invertebrate Paleontology, Part V, Revision 2. Treatise Online No 62*. Paleontological Institute, The University of Kansas, Lawrence, KA.
- Massaferro J., Larocque-Tobler, I., Brooks, S.J., Vandergoes, M., Dieffenbacher-Krall, A. & Moreno, P. (in press). Quantifying climate change in Huelmo mire (Chile, Northwestern Patagonia) during the Last Glacial Termination using a newly developed chironomid-based temperature model. *Palaeogeography, Palaeoclimatology, Palaeoecology*
- Masson-Delmonte, V., Schulz, M. (Hollis as contributing author), 2013. Chapter 5: Information from Paleoclimate Archives. IPCC Assessment Report 5, Working Group 1: The Physical Science Basis.
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- Panitz, S., Cortese, G., Neil, H.L. & Diekmann, B. (accepted). A Radiolarian-based paleoclimate history of Core Y9 (Northeast of Campbell Plateau, New Zealand) for the last 160 kyr. *Marine Micropaleontology*
- Percival, I.G., Zhen, Y.Y., Simes, J.E. & Cooper, R.A. 2014 Furongian (late Cambrian) brachiopods and associated conodonts from the Takaka Terrane in the Springs Junction – Maruia area, South Island, New Zealand. in Laurie, J.R. (ed)

- Cambro-Ordovician studies V. *Memoir of the Association of Australasian Palaeontologists* **45**, 55-70.
- Pojeta Jr., J., Simes, J.E. & Cooper, R.A. 2014 New Zealand Cambrian and Ordovician micromolluscs. in Laurie, J.R., (ed) Cambro-Ordovician studies V. *Memoir of the Association of Australasian Palaeontologists* **45**, 1-16.
- Prebble, J.G., Crouch, E.M., Carter, L., Cortese, G., Bostock, H. & Neil, H. 2013a. An expanded modern dinoflagellate cyst dataset for the Southwest Pacific and Southern Hemisphere with environmental associations. *Marine Micropaleontology* **101**, 33-48.
- Prebble, J.G., Crouch, E.M., Carter, L., Cortese, G. & Nodder, S.D. 2013b. Dinoflagellate cysts from two sediment traps east of New Zealand. *Marine Micropaleontology* **104** (2013), 25–37.
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- Roncaglia, L., Fohrmann, M., Milner, M., Morgans, H.E.G. & Crundwell, M.P. 2013. Well log stratigraphy in the central and southern offshore area of the Taranaki Basin, New Zealand. *GNS Science report* 2013/27. iii, 26 p. + enclosures.
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University of Otago

Daphne Lee (Geology Department) and co-PI, Dallas Mildenhall from GNS Science, have been awarded Marsden funding for a new three-year project entitled "Captured in amber: ecological complexity in NZ's ancient araucarian forests". New Zealand amber is abundant in coal and other sediments, but it is opaque and was previously thought to lack fossils. However, our pilot study has already revealed a remarkable number of new species including exquisitely preserved organisms such as spiders and their webs, pseudoscorpions, mites, midges, wasps, ants, beetles, moths or butterflies and many types of fungi, as well as pollen and wood. Other people involved in this exciting research include **Uwe Kaulfuss**, **Jon Lindqvist** and **Jennifer Bannister** at University of Otago, **Liz Kennedy** at GNS Science, **John Conran**, University of Adelaide, and **Alexander Schmidt** and his amber research group at the University of Göttingen.

Uwe Kaulfuss has continued research on fossils in lake sediments from the early Miocene Foulden Maar and an overview paper on the diversity of arthropods was published recently in *Lethaia*. Preliminary excavations at a new Miocene maar lake deposit at Hindon by Daphne Lee, Jon Lindqvist and Uwe Kaulfuss in early 2014 have yielded a well-preserved terrestrial biota, including diverse arthropods, which are currently under study. An MSc project at the University of Bonn, Germany, co-supervised by Torsten Wappler and Uwe Kaulfuss, will provide a first look into the diversity of Miocene arthropod-plant interactions at Hindon Maar. Several field trips by Uwe Kaulfuss in 2014 have established numerous new South Island amber localities (Cretaceous to Pliocene).

A Special Issue of *New Zealand Geology and Geophysics* on NZ Oligocene-Miocene paleogeography was published in mid-2014, with several papers dealing with rocky shore sites in southern New Zealand, one of which, Cosy Dell, has a remarkable, extremely diverse molluscan and ostracod fauna. **Henry Gard** completed an Hons project on the paleoecology of the late Oligocene estuarine Pomahaka Formation, while **Marcus Richards's** Hons thesis explored the paleogeography of the East Maniototo area.

Jeffrey Robinson is continuing research on living and fossil brachiopods, mainly craniids, for his PhD thesis. A paper in *Lethaia* records the first known examples of repair of predatory drill-holes in the shells of living brachiopods and discusses how the drill-holes are repaired and possible implications for brachiopod biology. Two other short papers look in detail at the anatomy of modern craniid brachiopods, including gut structure, and the function of several pairs of muscles. A new mechanism for opening the valves of these brachiopods is proposed.

Tammo Reichgelt has almost completed his PhD research on paleoclimate records from Miocene New Zealand using CLAMP and related methods. **Joe Jackson** has been working on an MSc on the fossil plants preserved in the Miocene Landslip Hill silcrete.

John Conran, University of Adelaide, is continuing his collaboration in a Marsden-funded research project on Miocene fossil floras and climates in southern New Zealand. In addition, the trans-Tasman ARC-funded project entitled: "The Eocene high latitude Australasian 'tropics' in a changing climate – clarifying the evidence"

has produced an initial comparison of three late Eocene sites in Southland (Pikopiko, Puysegur and Waicoe) as well as progression on several papers on some of the more conspicuous floristic elements in these and other Eocene sites. He is also part of a multi-author collaborative project coordinated through UNE on fossil sedges entitled: Synchrotron analysis of fossils calibrates molecular phylogeny of mapaniid sedges, recent funding success resulting in a session in early Oct 2014 where a range of fossil fruits and seeds were scanned.

Jennifer Bannister is continuing her research on leaf fossils and flowers from Foulden and Hindon maars, and Eocene epiphyllous fungi from Pikopiko Fossil Forest.

Publications since 2013 include:

- Baird, M.J., Lee, D.E. & Lamare, M.D. 2013. Reproduction and growth of the Terebratulid Brachiopod *Liothyrella neozelanica* Thomson, 1918 from Doubtful Sound, New Zealand. *Biological Bulletin* **225**, 125–136.
- Buckeridge, J.S., Lee, D.E. & Robinson, J.H. 2014. A diverse shallow-water barnacle assemblage (Cirripedia: Sessilia) from the Oligocene of Southland, New Zealand. *New Zealand Journal of Geology and Geophysics* **57**, 253–263.
- Carpenter, R.J., Bannister, J.M., Lee, D.E. & Jordan, G.J. 2014. *Nothofagus* subgenus *Brassospora* (Nothofagaceae) leaf fossils from New Zealand: a link to Australia and New Guinea? *Botanical Journal of the Linnean Society* **174**, 503–515.
- Conran, J.G., Bannister, J.M., Mildenhall, D.C., Lee, D.E., Chacon, J. & Renner, S.S. 2014. Leaf fossils of *Luzuriaga* and a monocot flower with in situ pollen of *Liliacidites contortus* Mildenh. & Bannister sp. nov. (Alstroemeriaceae) from the Early Miocene. *American Journal of Botany* **101**, 141–1455.
- Conran, J.G., Lee, W.G., Lee, D.E., Bannister, J.M. & Kaulfuss, U. 2014. Reproductive niche conservatism in an isolated island biota over 20 million years. *Biology Letters* **10**(10), 2014.0647 (6 pp.)
- Conran, J.G., Mildenhall, D.C., Lee, D.E., Lindqvist, J.K., Shepherd, C., Beu, A.G., Bannister, J.M. & Stein, J.K. 2014. Subtropical rainforest vegetation from Cosy Dell, Southland: plant fossil evidence for Late Oligocene terrestrial ecosystems. *New Zealand Journal of Geology and Geophysics* **57**, 236–252.
- Kaulfuss, U., Harris, A.C., Conran, J.G. & Lee, D.E. 2014. An early Miocene ant (subfam. Amblyoponinae) from Foulden Maar: the first fossil Hymenoptera from New Zealand. *Alcheringa* **38**, 568–574.
- Kaulfuss, U., Lee, D.E., Barratt, B.I.P., Leschen, R.A.B., Lariviere, M.-C., Dlussky, G.M., Henderson, I.M. & Harris, A.C. 2014. A diverse terrestrial arthropod fauna in Zealandia: evidence from the early Miocene Foulden Maar fossil lagerstätte. *Lethaia* DOI: 10.1111/let.12106
- Lee, D.E., Lindqvist, J.K., Beu, A.G., Robinson, J.H., Ayress, M.A., Morgans, H.E.G. & Stein, J.K. 2014. Geological setting and diverse fauna of a Late Oligocene rocky shore ecosystem, Cosy Dell, Southland. *New Zealand Journal of Geology and Geophysics* **57**, 195–208.
- Mildenhall, D.C., Kennedy, E.M., Lee, D.E., Kaulfuss, U., Bannister, J.M., Fox, B. & Conran, J.G. 2014. Palynology of the Early Miocene Foulden Maar, Otago, New Zealand: diversity following destruction. *Review of Palaeobotany and Palynology* **204**, 27–42.
- Reichgelt, T., Jones, W.A., Jones, D.T., Conran, J.G., Bannister, J.M., Kennedy, E.M., Mildenhall, D.C. & Lee, D.E. 2014. The flora of Double Hill (Dunedin

- Volcanic Complex, Middle–Late Miocene) Otago, New Zealand. *Journal of the Royal Society of New Zealand*, DOI: 10.1080/03036758.2014.923476
- Robinson, J.H. 2014. The muscles, body wall and valve-opening mechanism of extant craniid (inarticulated) brachiopods. *Journal of Natural History* **48**, 1–22.
- Robinson, J.H. 2014. Variations in the gut of craniid (inarticulated) brachiopods. *Zoological Science* **31**(8), 542–545

Ewan Fordyce and PhD students continue research on evolution, systematics and morphology of Cetacea - whales and dolphins - and other vertebrates mostly from New Zealand mid-Cenozoic strata. There is also some ongoing work on extant material. Recent visiting researchers include **Hiroto Ichishima** (Fukui Prefectural Dinosaur Museum) on beaked whales, and **Mike Gottfried** (Michigan State University) on fossil teleosts. Ewan has continued research with the PhD students on early baleen whales and dolphins, has finished the initial field/lab project on the "Lost Mammals of Zealandia", has worked with **Felix Marx** (now postdoctoral fellow at National Museum of Nature and Science, Tsukuba, Japan) on a new large phylogenetic analysis of Mysticeti, and has been collecting and preparing vertebrates from the NZ lower to middle Paleocene as part of a study of vertebrate recovery from the K-Pg event. Ewan has also worked a little with Daphne Lee's group on terrestrial biotas. **Carolina Loch** has continued her postdoc in dentistry at University of Otago, working recently on ultrastructure of modern and fossil cetacean teeth. **Yoshi Tanaka** has just submitted his PhD on NZ Oligocene platanistoid dolphins, and has published the first contribution - naming a new genus, *Otekaiakea*, which appeared in PloS One. Robert (**Bobby**) **Boessenecker** has nearly completed his PhD on Eomysticetidae, from NZ, and recently published on a new genus, *Torhoraata*, including material collected by Marples and by Fordyce. Another PhD paper deals with *Osedax* traces on NZ fossil mysticete bones. Bobby continues to publish on fossil marine mammals from the US west coast. **C-H Tsai** will soon complete his PhD on early baleen whales from the Kokoamu Greensand (early Chattian), and meanwhile has published several papers on evo-devo in modern and fossil mysticetes. **Josh Corrie** is well into his PhD on *Kekenodon*-like archaeocetes from NZ, with manuscript largely complete on an informative relatively complete skull. Moyna Muller is working mainly on cetacean flipper musculoskeletal systems. **Simone Hicks** successfully completed her PhD on foraminifera from Runangan (late Priabonian) sedimentary rocks associated with the Waiareka Volcanics of North Otago, and has returned to Germany. **Sophie White** has continued to help run the fossil prep lab.

- Ando, T. & Fordyce, R.E. 2014. Evolutionary drivers for flightless, wing-propelled divers in the Northern and Southern Hemispheres. *Palaeogeography Palaeoclimatology Palaeoecology* **400**, 50–61.
- Boessenecker, R.W. & Fordyce, R.E. 2014. A new eomysticetid (Mammalia: Cetacea) from the Late Oligocene of New Zealand and a re-evaluation of '*Mauicetus*' *waitakiensis*. *Papers in Palaeontology* **1**: DOI 10.1002/spp2.1005.
- Boessenecker, R.W. & Fordyce, R.E. 2014. Trace fossil evidence of predation upon bone-eating worms on a baleen whale skeleton from the Oligocene of New Zealand. *Lethaia* DOI: 10.1111/let.12108.
- Boessenecker, R.W., Perry, F.A. & Schmitt, J.G. 2014. Comparative Taphonomy, Taphofacies, and Bonebeds of the Mio-Pliocene Purisima Formation, Central

- California: Strong Physical Control on Marine Vertebrate Preservation in Shallow Marine Settings. *PLoS One* **9**(3): e91419-Article No.: e91419.
- Buono, M.R., Reidenberg, J.S., Fernández, M.S. & Fordyce, R.E. 2014. Anatomy of nasal complex in the Southern Right Whale, *Eubalaena australis* (Cetacea, Mysticeti). *Journal of Anatomy* doi: 10.1111/joa.12250.
- Butti, C., Fordyce, R.E., Ann Raghanti, M., Gu X., Bonar, C.J., Wicinski, B.A., Wong E.W., Roman, J., Brake, A., Eaves, E. et al. 2014. The cerebral cortex of the Pygmy Hippopotamus, *Hexaprotodon liberiensis* (Cetartiodactyla, Hippopotamidae): MRI, cytoarchitecture, and neuronal morphology. *The Anatomical Record* 10.1002/ar.22875.
- El Adli, J.J., Demere, T.A. & Boessenecker, R.W. 2014. *Herpetocetus morrowi* (Cetacea: Mysticeti), a new species of diminutive baleen whale from the Upper Pliocene (Piacenzian) of California, USA, with observations on the evolution and relationships of the Cetotheriidae. *Zoological Journal of the Linnean Society* **170**(2), 400-466.
- Gottfried, M.D. & Fordyce, R.E. 2014. A Late Triassic chimaeroid egg capsule from New Zealand: early evidence of chimaeroid reproductive mode from the eastern margin of Gondwana. *Journal of Systematic Palaeontology* doi.org/10.1080/14772019.2014.880752.
- Gottfried, M.D. & Fordyce, R.E. 2014. An Early Triassic basal actinopterygian fish (Osteichthyes) from D'Urville Island, New Zealand. *New Zealand Journal of Geology and Geophysics* DOI: 10.1080/00288306.2014.898314.
- Loch, C., Swain, M.V., Fraser, S.J., Gordon, K.C., Kieser, J.A. & Fordyce, R.E. 2014. Elemental and chemical characterization of dolphin enamel and dentine using X-ray and Raman microanalyzes (Cetacea: Delphinoidea and Iniioidea). *Journal of Structural Biology* **185**(1), 58-68.
- Scott, J.M., Lee, D.E., Fordyce, R.E. & Palin, J.M. 2014. A possible Late Oligocene-Early Miocene rocky shoreline on Otago Schist. *New Zealand Journal of Geology and Geophysics* **57**(2), 185-194.
- Tanaka, Y. & Fordyce, R.E. 2014. Fossil dolphin *Otekaikea marplei* (latest Oligocene, New Zealand) expands the morphological and taxonomic diversity of Oligocene cetaceans. *PLoS One* **9**(9): e107972.
- Tsai, C-H. & Fordyce, R.E. 2014. Disparate heterochronic processes in baleen whale evolution. *Evolutionary Biology* 1-9 10.1007/s11692-014-9269-4.
- Tsai, C-H. & Fordyce, R.E. 2014. Juvenile morphology in baleen whale phylogeny. *Naturwissenschaften* doi 10.1007/s00114-014-1216-9.
- Tsai, C-H., Fordyce, R.E., Chang, C-H. & Lin, L-K. 2014. Quaternary fossil Gray Whales from Taiwan. *Paleontological Research* **18**(2), 82-93.

University of Auckland

John (Jack) Grant-Mackie (Hon. Research Fellow) continued with occasional research projects, some commenced a few years ago, but most of quite recent origin. Two publications have appeared during the year and one or two MSS have been submitted for publication. Of the latter, a major work on the Late Triassic Bryozoa of New Caledonia, with two German colleagues, is with the editor and should appear next year. A new project for which data are now being gathered examines an undescribed very Late Triassic orthoconic nautiloid from the upper part of the *Monotis* shellbeds (Late Triassic) of New Zealand.

- Grant-Mackie, J.A. 2013. *Makoiomya cotterallae*, a new genus and species of bivalve (Ceratomyidae) from the latest Triassic of New Zealand and New Caledonia. *Zootaxa* **3741**(3), 327-348.
- Grant-Mackie, J.A., Yamakita, S., Takemura, A., Aita, Y., Takahashi, S., Hori, R.S. & Campbell, H.J. 2014. A probable shark dorsal fin spine fragment from the Early Triassic of the Arrow Rocks sequence, Whangaroa, northern New Zealand. *New Zealand Journal of Geology & Geophysics* **57**, 295-299.

Geomarine Research, Auckland

Bruce Hayward still remains active in foraminiferal research despite the loss of most research funding which has forced the laying off of all remaining staff and the closure of the separate research offices and laboratory. He continues to work in the application of Pleistocene and Holocene planktic and benthic foraminifera to understanding SW Pacific paleoceanography, and Holocene earthquake and sea level histories, as well as chief editor (Foraminifera) for the World register of Marine Species (WoRMS). Research Associate **Margaret Morley** (Geomarine Research, Auckland) continues her documentation of the ecological distribution of Holocene and Recent ostracods of northern New Zealand.

- Barth, N.C., Kulhanek, D.K., Beu, A.G., Murray-Wallace, C.V., Hayward, B.W., Mildenhall, D.C. 2013. New c. 270 kyr strike-slip and uplift rates for the southern Alpine Fault and implications for the New Zealand plate boundary. *Journal of Structural Geology* **64**, 39-52.
- Bostock, H.C., Armand, L.K., Barrows, T.T., Carter, L., Chase, Z., Cortese, G., Dunbar, G., Ellwood, M., Hayward, B.W., Howard, W.R., Neil, H.L., Noble, T.L., Mackintosh, A., Moss, P.T., Moy, A.D., White, D., Williams, M.J. 2013. A review of the Australian-New Zealand sector of the Southern Ocean over the last 30 ka. *Quaternary Science Reviews* **74**, 35-57.
- Cortese, G., Dunbar, G., Scott, G.H., Carter, L., Bostock, H.C., Bowen, M., Neil, H., Crundwell, M.P., Sabaa, A.T., Hayward, B.W., Martinez, I., Sturm, A. 2013. Southwest Pacific Ocean response to a warmer world - insights from Marine Isotope Stage 5e. *Paleoceanography* **28**, 585-598.
- Figueira, B., Hayward, B.W. 2014. Impact of reworked foraminifera from an eroding salt-marsh front on sea-level studies, New Zealand. *New Zealand Journal of Geology and Geophysics* **57**, 378-389.
- Hayward, B.W. 2014. Monospecific and near-monospecific benthic foraminiferal faunas, New Zealand. *Journal of Foraminiferal Research* **44**, 300-315.
- Hayward, B.W., Figueira, B., Sabaa, A.T., Buzas, M.A. 2014. Multi-year life spans of high salt marsh agglutinated foraminifera from New Zealand. *Marine Micropaleontology* **109**, 54-65.
- Hayward, B.W., Scott, G.H. 2013. Historical review of New Zealand foraminiferal studies, in: Bowden, A.J., Gregory, F.J., Henderson, A.S. (Eds.), Landmarks in Foraminiferal Micropaleontology: History and Development. The Micropaleontological Society, Special Publications, London, pp. 271-283.

Seabourne Rust continues to research paleoecology and the New Zealand fossil record, including guiding groups of Australian school teachers around northern New Zealand examining aspects of the natural history of the Kauri tree (*Agathis australis*). Other projects this year have been intensive fieldwork in the Wanganui Basin Plio-Pleistocene as part of the WABO team, a collaboration with paleontologists from the University of Oslo (Norway), NHM (London) and GNS (NZ) studying details of fossil bryozoan faunas including occupancy and competitive interaction between taxa. He also visited the University of Otago (Dunedin) to examine recent bryozoan faunas with Abby Smith to be used for further analysis in Europe.

Rust, S. 2014. Late Cretaceous shark vertebrae (Chondrichthyes) from Koutu Boulders, Hokianga, Northland. p 2-4 in *Geocene 11*, accessed from www.gsnz.org.nz/information/auckland-i-46.html#mag

SWEDEN

Department of Palaeobiology, Swedish Museum of Natural History

Stephen McLoughlin continues work on Permian and Mesozoic seed-plants from eastern Australia, east Antarctica, and China. His work is funded by the Swedish Research Council and particularly focusses on the architecture of glossopterid and bennettitalean gymnosperms, and the faunal and fungal interactions with these plants. Stephen is currently the editor of *Alcheringa*.

Christian Pott continues work on the Bennettitales including a survey of reproductive structures from the Australian Mesozoic. His other work involves studies of a broad range of assemblages of Triassic to Cretaceous age from northern and central Europe and North China. He is currently the technical editor for *Grana*.

Benjamin Bomfleur recently obtained a Swedish Research Council “Young Researcher postdoctoral fellowship” in the Department of Paleobiology. He is investigating the phylogeny of Mesozoic ferns, and is also studying a series of exceptional three-dimensionally preserved fossils including Permian seeds from northeastern Australia, and clitellate annelid cocoons from Antarctica.

[consolidated list of publications]

Bomfleur, B., Decombeix, A.-L., Schwendemann, A.B., Escapa, I.H., Taylor, E.L., Taylor, T.N., McLoughlin, S. 2014. Habit and ecology of the Petriellales, an unusual group of seed plants from the Triassic of Gondwana. *International Journal of Plant Sciences* **175**, 1062–1075. DOI:10.1086/678087

Bomfleur, B., Klymiuk, A.A., Taylor, E.L., Taylor, T.N., Gulbranson, E.L. & Isbell, J.L. 2014. Diverse bryophyte mesofossils from the Triassic of Antarctica. *Lethaia* **47**, 120-132.

Bomfleur, B., McLoughlin, S. & Vajda, V. 2014. Fossilized nuclei and chromosomes reveal 180 million years of genomic stasis in Royal Ferns. *Science* **343**, 1376–1377 (+ online supplementary data pages 1–16, 2 video clips). DOI: 10.1126/science.1249884

- Bomfleur, B., Schöner, R., John, N., Schneider, J.W., Elsner, M., Viereck-Goette, L. & Kerp, H. 2014. New Palaeozoic deposits of the Victoria Group in the Eisenhower Range, northern Victoria Land, Antarctica. *Antarctic Science* **26**, 277–278.
- Bomfleur, B., Schöner, R., Schneider, J.W., Viereck, L., Kerp, H. & McKellar, J.L. 2014. From the Transantarctic Basin to the Ferrar Large Igneous Province: New palynostratigraphic age constraints for Triassic-Jurassic sedimentation and magmatism in East Antarctica. *Review of Palaeobotany and Palynology* **207**, 18–37.
- Carpenter, R.J., McLoughlin, S., Hill, R.S, McNamara, K.J. & Jordan, G.J. 2014. Early evidence of xeromorphy in angiosperms: stomatal encryption in a new Eocene species of *Banksia* (Proteaceae) from Western Australia. *American Journal of Botany* **109**, 1486–1497.
- Decombeix, A.-L., Bomfleur, B., Taylor, E.L. & Taylor, T.N. 2014. New data on the anatomy and systematic affinities of corystosperm wood from the Triassic of Antarctica. *Review of Palaeobotany and Palynology* **203**, 22–34.
- Hübers, M., Bomfleur, B., Pott, C., Krings, M. & Kerp, H. 2014. A reappraisal of Mississippian (Tournaisian and Visean) adpression floras from central and northwestern Europe. *Zitteliana* **54**, 39–52.
- Launis, A., Pott, C. & Mørk, A. 2014. A glimpse into the Carnian: Late Triassic plant fossils from Hopen, Svalbard. *Norwegian Petroleum Directorate Bulletin* **11**, 35–42.
- McLoughlin, S., Bomfleur, B. & Vajda, V. 2014. A phenomenal fossil fern – forgotten for 40 years. *Deposits Magazine* **40**, 16–21.
- McLoughlin, S., Jansson, I.-M. & Vajda, V. 2014. Megaspore and microfossil assemblages reveal diverse herbaceous lycophytes in the Australian Early Jurassic flora. *Grana* **53**, 22–53.
- Pott, C. 2014. A revision of *Wielandiella angustifolia* – a shrub-sized bennettite from the Rhaetian–Hettangian of Scania, Sweden, and Jameson Land, Greenland. *International Journal of Plant Sciences* **175**, 467–499.
- Pott, C. 2014. The Triassic flora of Svalbard. *Acta Palaeontologica Polonica* **59**, 709–740.
- Pott, C., Guhl, M. & Lehmann, J. 2014. The Early Cretaceous flora from the Wealden facies at Duingen, Germany. *Review of Palaeobotany and Palynology* **201**, 75–105.
- Pott, C. & McLoughlin, S. 2014. Divaricate growth habit in Williamsoniaceae (Bennettitales): unravelling the ecology of a key Mesozoic plant group. *Palaeobiodiversity and Palaeoenvironments* **94**, 307–325. DOI 10.1007/s12549-014-0157-9
- Rößler, R., Philippe, M., van Konijnenburg-van Cittert, J.H.A., McLoughlin, S., Sakala, J., Zijlstra, G. & 35 others, 2014. Which name(s) should be used for Araucaria-like fossil wood? – Results of a poll. *Taxon* **63**, 177–184.
- Vajda, V., McLoughlin, S. & Bomfleur, B. 2014. Fossilfyndet i Korsaröd. *Geologiskt Forum* **82**, 24–29.
- Van Konijnenburg-van Cittert, J.H.A., Kustatscher, E., Bauer, K., Pott, C., Schmeißner, S., Dütsch, G. & Krings, M. 2014. A *Selaginellites* from the Rhaetian of Wüstenwelsberg (Upper Franconia, Germany). *Neues Jahrbuch für Geologie und Paläontologie, Abhandlungen* **272**, 115–127.

Lund University

Vivi Vajda (Department of Earth and Ecosystem Sciences) continues to work on high-resolution palynology, sedimentology, and geochemistry of major extinction and biotic radiation events in Earth's history. She is especially investigating sections in New Zealand, eastern Australia, NW China, western North America and Colombia. She supervises a research student investigating Late Cretaceous biotas from the Kristianstad Basin, southern Sweden. In April 2015, Vivi will take up the position of Head of the Department of Palaeobiology at the Swedish Museum of Natural History in Stockholm.

- Badawy, A.S., Mehlqvist, K., Vajda, V., Ahlberg, P. & Calner, M. 2014. Late Ordovician (Katian) spores in Sweden – oldest land plant remains from Baltica. *GFF Scandinavian Journal of Earth Sciences* **136**, 16–21.
- Bercovici, A., Cui, Y., Forel, M.-B., Yu, Y. & Vajda, V. (in press). Terrestrial paleoenvironment characterization across the Permian–Triassic boundary in South China. *Journal of Asian Earth Sciences*.
- Bomfleur, B., McLoughlin, S. & Vajda, V. 2014. Fossilized nuclei and chromosomes reveal 180 million years of genomic stasis in Royal Ferns. *Science* **343**(6177), 1376–1377.
- McLoughlin, S., Jansson, I.-M. & Vajda, V. 2014. Megaspore and microfossil assemblages reveal diverse herbaceous lycophytes in the Australian Early Jurassic flora. *Grana* **53**, 22–53.
- Mehlqvist, K., Larsson, K. & Vajda, V. 2014. Linking upper Silurian terrestrial and marine successions—Palynological study from Skåne, Sweden. *Review of Palaeobotany and Palynology* **202**, 1–14.
- Mehlqvist, K., Wigforss-Lange, J. & Vajda, V. (in press). Late Silurian (Ludfordian) palynological assemblages from Sweden (Klinta) reveal stable terrestrial environments during times of extreme marine conditions. *Earth and Environmental Science Transactions of the Royal Society of Edinburgh*.
- Steinthorsdottir, M. & Vajda, V. (in press). Early Jurassic (late Pliensbachian) CO₂ concentrations based on stomatal analysis of fossil conifer leaves from eastern Australia. *Gondwana Research* <http://dx.doi.org/10.1016/j.gr.2013.08.021>
- Vajda, V. & Bercovici, A. (in press). The global vegetation pattern across the Cretaceous–Paleogene mass-extinction interval – an integrated global perspective. *Global and Planetary Change*.
- Vajda, V., Ocampo, A., Ferrow, E. & Bender Koch, C. (in press). Nano particles as the primary cause for long-term sunlight suppression at high southern latitudes following the Chicxulub impact –evidence from ejecta deposits in Belize and Mexico. *Gondwana Research*.

UNITED KINGDOM

The Natural History Museum, London

Greg Edgecombe splits his time between research on higher-level arthropod phylogenetics, centipede systematics, and Cambrian animals known from soft-part preservation. The latter has in recent years concentrated on the Emu Bay Shale (South Australia) and Chengjiang (Yunnan, China) Konservat-Lagerstätten.

- Dunn, C.W., Giribet, G., Edgecombe, G.D. & Hejnol, A. 2015. Animal phylogeny and its evolutionary implications. *Annual Review of Ecology, Evolution and Systematics* **45**, 371-395.
- Bonato, L., Edgecombe, G.D. & Minelli, A. 2014. Geophilomorph centipedes from the Cretaceous amber of Burma. *Palaeontology* **57**, 97-100.
- Cong, P., Ma, X., Hou, X., Edgecombe, G.D. & Strausfeld, N.J. 2014. Brain structure resolves the segmental affinity of anomalocaridid appendages. *Nature* **513**, 538-542.
- Daley, A.C. & Edgecombe, G.D. 2014. Morphology of *Anomalocaris canadensis* from the Burgess Shale. *Journal of Paleontology* **88**, 68-91.
- Edgecombe, G.D. & Legg, D.A. 2014. Origins and early evolution of arthropods. *Palaeontology* **57**, 457-468.
- Fernández, R., Laumer, C.E., Vahtera, V., Libro, S., Kaluziak, S., Sharma, P.P., Pérez-Porro, A.R., Edgecombe, G.D. & Giribet, G. 2014. Evaluating topological conflict in centipede phylogenetics using transcriptomic datasets. *Molecular Biology and Evolution* **31**, 1500-1513.
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UNITED STATES OF AMERICA

University of Oregon, Eugene

Gregory Retallack reports that discovery of paleosols on Mars was the biggest research news from the Retallack laboratory this year. The superb analytical capabilities of Curiosity Rover now allow unprecedented geochemical evaluation of weathering in Mars some 3.7 billion years ago. The paleosols are thin, gray and have many sulfate nodules, amazingly similar to Archean (3.3-3.5 Ga) paleosols from the Pilbara region of Western Australia, which have been under scrutiny for the past decade and now are approaching readiness for prime time. Debate over the affinities and habitats of Ediacaran fossils continues with a bit of back and forth in published comments, but two new studies also add fuel to the fire. Newfoundland Ediacaran fossils may not have been deep water after all. Furthermore, numerous paleosols in the Bunyerroo, Wonoka, and Bonney Formations of South Australia allow a better understanding of the Wonoka-Shuram isotopic anomaly, which is no longer the biggest isotopic excursion in Earth history, but a short sharp shock coincident with the ECAP acritarch mass extinction.

As director of the Condon Collection of the Museum of Natural and Cultural History at the University of Oregon, Greg has been active rearranging collections in new dust-proof cabinets. Digitization efforts led by Edward Davis have also come to fruition with publication of our fossil catalog online through the portal “paleo.uoregon.edu”. The collection includes some Australian fossils, and we are especially proud of our Precambrian and early Paleozoic “paleobotany” collection. Paleobotany deals with more than just land plants, and has been the traditional home of Precambrian Paleobiology.

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