

THE VICTORIAN GEOLOGIST



THE GEOLOGICAL SOCIETY OF AUSTRALIA
Victoria Division
invites you to the

September 2014

SELWYN SYMPOSIUM 2014 **The Nullarbor Plain: Recent Advances**

Friday 3 October 2014

Selwyn Lecture given by:

Professor Paul Williams

School of Environment, University of Auckland

Elizabeth Murdoch Theatre, Old Pathology Building, University of Melbourne

The Selwyn Lecture is held in lieu of the September General Meeting

The Geological Society of Australia (Victoria Division) Selwyn Memorial Lecture and Symposium commemorate the work of A.R.C. Selwyn, the first Government Geologist of Victoria.

The world's largest continuous karst area, the 200,000 km² Nullarbor Plain, is a flat, mostly treeless limestone plain terminating abruptly at a cliff-line that mostly falls sheer into the sea. The flat-lying Eocene-Miocene shallow marine calcarenites host >150 collapse dolines and ~100 caves with substantial, sometimes very large passages, as well as a huge number of blowholes. The caves and their contents, the karst landscape chronology and the environmental setting have been subject to significant exploration and research. This symposium brings together leading researchers who have brought new techniques and discoveries to a fascinating landscape.

SELWYN LECTURE SPEAKER BIO & ABSTRACT**Professor Paul Williams**

Paul's formal qualifications include degrees from Durham, Dublin and Cambridge Universities. Before joining the staff at Auckland, he was a member of staff at the Australian National University and the University of Dublin (TCD). He has retired from teaching, but maintains an active research program. In 2007 he was the Hochstetter Lecturer (an annual award of the Geological Society of NZ), a Senior Fellow, International Association of Geomorphologists and a Hon. Life Member, National Speleological Society (USA).

Paul's interests range from geomorphology through hydrology to environmental change. He has a specialist research interests in caves and limestone (karst) terrains and has completed a global review of karst World Heritage sites for the International Union for the Conservation of Nature (IUCN). He is a member of the World Commission for Protected Areas. He is a co-author (with Derek Ford) of the comprehensive book *Karst Hydrogeology and Geomorphology*.

His current research focus is on Quaternary palaeoclimate of New Zealand. Information on this is obtained from speleothems which contain high resolution, quantitative records of past temperatures and precipitation (from stable isotopes and trace element ratios). The records produced from this source are verified against palaeoclimate time series derived independently from tree-rings and lake sediments (by Dr Paul Augustinus and others).

Downstream reflections of an upstream environment

Understanding the development of karst and caves of the Nullarbor Plain has been -and remains- a challenge. The limestones are relatively young and chalky compared to the dense crystalline limestones in which most karsts are developed; and the climate is so dry that evapotranspiration considerably exceeds precipitation. Consequently, circumstances are not auspicious for karst development. In 1963 Jennings called it "an immature, retarded karst." Yet in spite of that there are about 100 known caves, over 150 collapse dolines and perhaps 4,500 small caves and blowholes. But given the huge area – 200,000 km² – that still not a high density, and most known caves are relatively close to the coast.

Establishing a quantitative chronology of events has proved difficult. The Nullarbor limestones emerged about 35 Ma, re-submerged, and then emerged finally in the Mid Miocene about 14 million years ago. As the sea regressed, rivers sourced on the adjacent basement rocks extended across the emerging sea floor for up to 130 km, but incised only about 10 m. This could have been in the Mid Pliocene according to sedimentary evidence provided by Clarke, Alley and others. Since its emergence, dissolution has

SELWYN LECTURE SPEAKER ABSTRACT CONT.

lowered the surface 30-70 m and has initiated development of the karst groundwater system. During the Late Cenozoic, when major caves were developing, baselevel would have been relatively high with the sea perhaps 50 to 30 m higher than at present.

Some major advances in our understanding of the timing of events have occurred recently. This has been driven by U-Pb dating of speleothems by Jon Woodhead's group at the University of Melbourne. We now know there was speleothem deposition in Nullarbor caves in the Mid Pliocene, 3.77 – 4.09 million years ago.

The circumstances that would permit speleothem deposition in such an arid environment remain conjectural. Presumably there were rain-bearing cold front incursions from the Southern Ocean. Here evidence from the neighbouring Naracoorte karst in South Australia helps, because the processes that drove speleothem deposition at Naracoorte would also have been felt on the Nullarbor.

Research by Ayliffe, Moriarty and others at Naracoorte has shown that there were 4 or 5 wet periods with speleothem deposition in the last 500,000 years and that they coincided with stadials and cool interstadials.

The pattern and dating of stadials and interstadials is particularly well-established in New Zealand (at the same latitude as Naracoorte). This information helps refine still further the global circulation circumstances that favoured speleothem deposition in southern Australia: it suggests that speleothem growth is favoured in southern Australia as interstadials cool and give way to stadials. At such times the westerly wind circulation intensifies and expands equatorwards (introducing more rain from cold fronts), lowers temperatures, reduces evapotranspiration and leaves water surplus for percolation.

Intensification of westerly wind circulation is associated with increased hemispheric temperature gradients as the polar regions cool. It has been suggested recently that an inter-hemispheric hydrological seesaw involving latitudinal migration of the Intertropical Convergence Zone explains intervals of speleothem deposition at Naracoorte (and would therefore have implications for the Nullarbor), but wider antipodean evidence lends little support to this mechanism.

Presentation of the 2014 Selwyn Medal**Dr Ian Duddy, Geotrack International**

See Program on pages 5 and 6 for times of Selwyn Lecture and Medal presentation



THE SELWYN SYMPOSIUM

Registration and Payment:

Non GSA members	\$95
Members	\$80
Students	\$55

Cost includes Lunch, morning/afternoon teas, abstract volume. Selwyn Dinner is extra.

Payment may be made at Registration on the day but it is important to book. Payment in advance can be made by cheque or credit card.

Print this form off and forward with payment to:
Dr S. White 123 Manningham St Parkville 3052

The preferred way to book is via our new GSA (Vic) website www.gsavic.org

BOOKING FORM

I/we wish to attend The 2014 Selwyn Symposium

Cost: \$95 non GSA members; \$80 GSA members \$55 for full time students (all costs GST inclusive; \$4.00 credit card surcharge).

Name (s) & affiliation: _____

_____ Email: _____ Tel: _____

Please select the event you wish to attend:

I/we will be attending the Selwyn Symposium []

I/we will be attending the FREE Selwyn Lecture [] (RSVP: to guarantee a seat)

I/we wish to go to the Selwyn Dinner @ 8.00pm [] (Details and costs of this will be provided soon on the website).

Payment Cheque []

Credit Card []

VisaCard / Mastercard No. _ _ _ _ _

Name on card: _____

Expiry Date: __ / __

Signature: _____

SELWYN SYMPOSIUM PROGRAM

Detailed Program

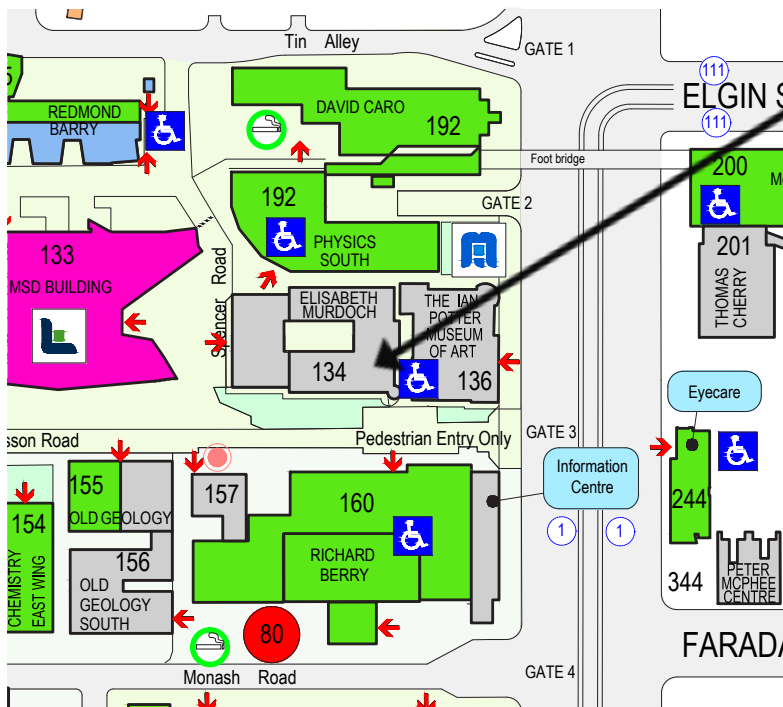
Some changes may occur.

8:00 – 9:00	Symposium Registration
9:05 – 9:15	Introduction and opening address
9:15 – 10:00	Plenary Address A/Prof John Webb, La Trobe University <i>The Nullarbor - flat but far from boring.</i>
10:00 – 10:30	Dr Jon Clarke, Canberra <i>Advances in Understanding the evolution of the Eucla Basin over the past decade.</i>
10:30 – 11:00	Morning Tea
11:00 – 11:30	Prof Jon Woodhead, University of Melbourne <i>Nullarbor speleogenesis: constraints from U-Pb geochronology.</i>
11:30 -12:00	Dr John Hellstrom, University of Melbourne <i>Late Quaternary speleothem geochronology of the Nullarbor Plain.</i>
12:00 - 12:30	A/Prof Russell Drysdale, University of Melbourne <i>Stable oxygen and carbon isotope records from Nullarbor speleothems.</i>
12:30 – 1:30	Lunch
1:30 – 2:00	Dr Kale Sniderman, University of Melbourne <i>Late Neogene vegetation and climate history of the Nullarbor Plain: new insights from fossil pollen records of U-Pb-dated speleothems.</i>
2:00 – 2:30	Ms Elen Shute, Flinders University <i>Million-year menagerie: the Thylacoleo Caves fossil fauna.</i>
2:30 – 3:00	Mr Shannon Burnett, La Trobe University <i>Shallow caves and blowholes on the Nullarbor Plain, Australia — Flank margin caves on a low gradient limestone platform.</i>
3:00 – 3:30	Mr Ian Lewis & Ms Liz Rogers, La Trobe University, Cave Diving Association Australia <i>Underwater geology and geomorphology of the southern Nullarbor.</i>
3:30 – 4:00	Afternoon Tea

SELWYN SYMPOSIUM PROGRAM

- 4:00 – 4:30 Mr Ian Lewis, Latrobe University
The role of tectonics on the deep caves array - a template for large global Tertiary karst areas.
- 4:30 – 5:00 Dr Susan White & Dr Gresley Wakelin-King, La Trobe University, Wakelin Associates
Natural heritage values of the Nullarbor and National Heritage List criteria.
- 5:00 – 5:10 Discussion & Conclusion
- 5:10 – 6:00 **Drinks & refreshments**
- 6:00 – 6:15 **Selwyn Medal Presentation** to Dr Ian Duddy, Geotrack International.
- 6:15 – 7:15 **Selwyn Lecture** by Prof Paul Williams, Auckland University.
Downstream Reflections of an Upstream Environment
- 8:00 **Selwyn Dinner**, Café Italia, 56 University St Carlton (bookings required.)

THE SELWYN SYMPOSIUM - DIRECTIONS



Elizabeth Murdoch Theatre.

Building 134 (Room G06), Spencer Road; (Campus Map Reference: F 20)

Extra Directions: Enter the theatre foyer at ground level through the marble doorway and large glass doors very near to Castro's Café (this is the outdoor café with the large wooden tables). You exit the theatre through the same door. Please note that there is no access to this theatre from any of the other doors into Elisabeth Murdoch Building.

THE AUGUST MEETING

Last month, Dr Barbara Wagstaff delivered a very interesting overview of the relationships that can be deduced from pollen associated with the dinosaur finds from the southern Victorian coast.

After the discovery of the 'Cape Paterson Claw' in 1903, no further discoveries were made until the 1980s. Since 1984 of hundreds of volunteers, university and Museum staff have undertaken thousands of man hours to extract dinosaur, bird and mammal fossils from heavily lithified Early Cretaceous sediments of the Strzelecki and Otway Groups on the Otway and South Gippsland coasts.

A major problem is that there is neither any absolute dating technique nor marine sediments which can accurately date the fossils, limiting age comparison with rest of the world during the Early Cretaceous. However pollen is a very useful proxy. The pollen is not found in the coarser fluvial sediments hosting the dinosaur bones but in finer mud sediments associated with terrestrial flood events. Attempts at Fission – Track analysis did not prove successful but perhaps U/Pb dating may be valuable; the main issue here is finance.

The problems of actual excavation on the stormy coastal sites included issues of access, thick vegetation, tides, sites being covered with sand, complex geology and faulting and the presence of dykes "cooking" the pollen. However there were enough lucky breaks with fine weather and low tides for sampling to occur. The work done along the South Gippsland coast to relate the geology more closely to the fossils has been crucial.

The problems of the technical methods of pollen analysis were discussed, especially as to how to filter local riparian from regional pollen. The relationship to the nature of deposition and its relationship to the regional rather than just the riparian vegetation is significant as it is the regional vegetation which is climate driven. Interestingly the research shows that the South Gippsland sites are older and have a stable vegetation community but the Otway sites are younger and more dynamic. This also may relate to climate changes and the emergence of angiosperms (flowering plants).

The talk finished with a discussion on what is still needed to be done: the San Remo to Kilcunda coast needs detailed investigation similar to the Inverloch area; the Otway coast needs known sites checked and new sites sought; and the ages on pollen zones need to be reassessed.

A really interesting talk. Thank you Barbara!

by Susan White

AIG AUSTRALIA SYNCHROTRON VISIT

AIG Victoria Branch
Call for interest!
Australian Synchrotron visit
Monday 29th September, 2014

This notice is a call for members to express their interest in participating in a visit to the Australian Synchrotron (see <https://www.synchrotron.org.au/>) at Monash University, in Clayton (SE Melbourne).

The scientific use of x-rays is well established. Since the mid-20th Century, short-wavelength synchrotron radiation has become a major research tool for the study of matter.

The Australian Synchrotron (AS) is actively promoting the various applications of its instrumentation, including geological applications, and is interested in giving presentations to geoscientists. A visit to the AS by GPIC has been arranged for Monday 29th September. No experiments with X-rays are conducted on Mondays, so interested parties are permitted to inspect the facility in some detail.

The current plan is that AS could present to a group of about 20-25. The group would meet at the AS at 10:30 a.m. An appropriate research scientist would present an initial description of what the AS can do. Thereafter the group may be split into smaller parties to be escorted around the facility. Discussion is encouraged and questions are invited and there would be further opportunity to discuss the work and potential uses of the synchrotron in the cafeteria at lunch. It is understood that the group could be informed and entertained by the AS staff until 3:30 p.m.

We should give the organisers at AS a better estimate of numbers likely to attend, so all those interested in participating in this visit, please let me know.

For more information and access to a link to an excerpt from the Australian Synchrotron 2013 Annual Report, Geology and Minerals, go to <http://www.aig.org.au/events/australian-synchrotron-visit/>

Contact:

Geoff Hodgson
Secretary
0407 242 359
03 5475 1325
geoff@blueumbrella.com.au

THE LIFE OF ALFRED HOWITT

It might have been in the Australia outback, searching for Burke and Wills, where Alfred Howitt first started to wonder about the ancient past of his adopted country. It might have been the undeniable age of the continent that caused him to wrestle with his Quaker beliefs; that led him to Darwin. It might have been observing the original inhabitants, or considering the bizarre nature of the flora and fauna, that sparked an interest in understanding the land not as a British outpost, but as a place unique and valuable in itself.

Whatever the initial cause, Alfred Howitt, autodidact and polymath, went on to achieve considerable success in the fields of geology, botany and anthropology. He received honorary doctorates from the universities of Cambridge and Melbourne, and was awarded the CMG.

While history records the public details of Howitt's life, the historical novel *In the Shadow of a Hero* considers the private man. Based on extensive research, the novel resurrects the neglected Howitt, bringing him to life not only through his achievements and scholarship, but also through the costs inflicted by his knowledge and ambitions.

In the Shadow of a Hero by Dr Jenny Herbert will be published by Arcadia in October, and launched at the Hill of Content bookshop in Melbourne on Thursday 30 September at 6 pm. GSA members are cordially invited to the launch. Please RSVP jennyherbert1@bigpond.com

NEW WEBSITE

The Victoria Division of The Geological Society of Australia has a brand new, shiny website:

www.gsavic.org

This new website has come together thanks to the hard work of Stefan Vollgger, our new webmaster.

The Victoria Division Committee would like to express its great appreciation to Stefan for creating this new website. Feel free to explore the site (some aspects will continue to be updated in the near future), and you will agree that it is a vast improvement upon the old one.

STUDENT FUNDING OPPORTUNITIES**Geological Society of Australia (Victoria Division) Student Research Scholarships**

The scholarship is valued at up to \$500 for travel within Australia and \$700 for travel outside of Australia. The number of and value of the scholarships awarded each year is made at the discretion of the GSA(Vic) committee.

Funding will not be granted retrospectively and applicants are asked to submit forms no later than 6 weeks prior to their trip to give the committee time to consider the application.

**Eligibility**

Applicants must be members of the GSA and enrolled in a full-time degree at a Victorian Tertiary institution and undertaking research in Geology. The scholarship will be awarded to assist with conference travel for honours and postgraduate students, who are presenting (either poster or talk) at the conference.

Honours and postgraduate students that receive this scholarship will be required to submit a report for publication in 'The Victorian Geologist' newsletter following to their trip. A presentation may also be requested by the committee, which will consist of a short 10-15 minute presentation prior to the monthly seminar.

Students who have previously received a GSAV research scholarship are not eligible. Scholarships and bursaries from other sources are acceptable.

Applications forms can be scanned and emailed to: secretary@vic.gsa.org.au

or mailed to:

Geology Research Scholarships Victoria
Geological Society of Australia (Victoria Division)
GPO Box 2355
Melbourne VIC 3001

More information can be found by contacting Barbara Wagstaff (wagstaff@unimelb.edu.au)

Something interesting to share? Want to see your name in print?

Don't be bashful, contribute to the GSA(V) monthly newsletter!

If there are any events, happenings, news, or views that would be of interest to the membership, please send your details and information to Kieran Iles at kiles@student.unimelb.edu.au

We'd be glad to hear from you

FORTHCOMING SEMINARS AND EVENTS

to be presented at
GSA (Victoria Division) meetings

Note: unless otherwise indicated, all 2014 talks will be held in the Fritz Loewe Theatre, Earth Sciences Building, University of Melbourne.

September 29th - October 3rd:

Karst and the Climate Record 7:

More details at <http://www.kr7.org/KR7.org>

Selwyn Symposium:

Selwyn Lecture given by Professor Paul Williams.

See pages 2-3 for details.

October 30th:

Monthly Meeting:

TBA

Please welcome our newest members



Visit the GSAV on www.gsavic.org or the GSA on www.gsa.org.au
• Renewing your GSA membership is easy - it can now be done online. •

CONSIDER CONTRIBUTING TO TAG!

It is member contributions which make TAG a member magazine – please keep the contributions coming and assist with informing all of the membership (not just your Division) about your activities.

Please send your news to: tag@gsa.org.au



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First Friday of the month except Dec & Jan
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