Joint RSWA/Naturalists' Club Excursion: Modern and Pleistocene rocky shore ecology

Loisette Marsh (WAM), John Huisman (DEC), Vic Semeniuk (RSWA)

11th April 2010, 9:00-12:00

Muderup Rocks, south of Cottesloe,
Meeting place at car-park (between Forrest St and Pearce St, on Marine Pde),
Muderup Rocks, Cottesloe (see map back page)

As part of the International Year of Biodiversity, for April there will be a joint RSWA/Naturalist Club Excursion. This will be an interesting excursion where Loisette Marsh (Western Australian Museum) will examine and explain the modern rocky shore fauna, John Huisman (Department of Environment & Conservation) will examine and explain the modern rocky shore algae, and Vic Semeniuk (The Royal Society of Western Australia) will explain the Pleistocene shore and its palaeoecology. As the water will most likely be relatively high (and not a summer low tide), bring sneakers or Wellington boots, for sub-surface viewing bring snorkeling gear and for the Pleistocene rocky shore component of the excursion bring sturdy shoes or sneakers, and don’t forget a sun hat and sun screen!
Global significance of the Antarctic – Professor Patrick Quilty AM

Over 100 RSWA members, and the general public arrived at the Kings Park Administration Building Theatrette at 7 pm on 15th March to hear Professor Patrick Quilty, former Chief Scientist, Australian Antarctic Division, currently School of Earth Sciences, University of Tasmania, and President of the Royal Society of Tasmania deliver a well-illustrated, excellent presentation on the “Global significance of the Antarctic”.

Pat commenced his talk by illustrating how much Antarctica influences life in Australia – a weather map focused on the Antarctica-Australia connection showed how circulation patterns around Antarctica, such as cold fronts, impinge upon and affect Australian weather. Pat then presented some information on Antarctica to provide a context and background: Antarctica’s continent area is 13.9 x 10^6 km2, its permanent ice shelves are 3-4 x 10^6 km2, its annual sea ice is 17 x 10^6 km2, its volume of ice is 30 x 10^6 km^3, the thickest amount of ice is almost 4800 m, its sea level effect is 70 m, and its lowest temperature is -89.6°C. Rock outcrop in Antarctica is ~ 1%. The population of all non-indigenous peoples in summer is ~ 4000, and in winter ~ 1200.

Pat emphasised that the Earth is “One World”, essentially that the Earth is a closed system, and that northern hemisphere effects have impact on Antarctica, and vice versa. The spring-time depletion of the ozone layer over Antarctica caused by northern hemisphere use of CFCs is an example of the connection.

The history of Science in Antarctica is marked by many prominent personalities and excursions over more than a century: three generations of the Enderbys, Henry Foster in 1829, James Eights, Dumont d’Urville in 1839/40, Charles Wilkes in 1839/40, James Clark Ross in 1840/41, the H.M.S. Challenger in 1874, the International Polar Year in 1882/83, Shackleton’s South Magnetic Pole Party, and Georg von Neumayer. One of the outcomes of the scientific expeditions was the mapping of the south magnetic pole that had moved from the 1600s near Ross Island northward.

Pat then moved on to discuss the global circulation effected by Antarctica. He showed the effect of the katabatic wind, the freezing of surface water to develop high salinity high density water that migrates as a plume across the continental shelf and descends to abyssal depth to migrate as a basal current to as far north as the Equator. Pat considered this to be the most critical phenomenon on the Earth’s surface today.

The story of the evolution of the Earth’s surface environment is locked in Antarctica, and is a story of ice. Annual layering of ice holds ice stratigraphic information, and with use of 1100 m of drilling into the ice to extract cores, and thin sections of ice, and elemental and isotopic studies, the history of the Earth’s environment has unfolded. Of particular use has been the trapped bubbles of gas (air) in the ice.
Pat showed the reconstruction of the historical content of CO$_2$ in the atmosphere over the past 1200 years from the Law Dome ice core, and, to put the CO$_2$ content into a longer term perspective, the history of CO$_2$, temperature and dust content over the past 400,000 years obtained from the Vostok ice core, and in a longer term perspective (from the Pliocene, i.e., 5.5 million years ago, to the present), by looking at the temperature signature provided by foraminifera and their oxygen isotopes, showing that there have been major fluctuations in temperature.

CO$_2$ in the atmosphere over the past 1200 years from the Law Dome ice core

The next topic was geology. Pat showed that the geological evolution of Antarctica was linked to Australia’s. With the assembly and dispersal of supercontinents such as Rodinia, Pangea, and Gondwana, Antarctica and Australia have remained firmly linked. Break-up of Australia from Antarctica began incipiently 120 million years ago, with a seaway developed by 80-60 million years ago, with a gateway from the Indian Ocean to Antarctica by ~ 34 million years ago, and Australia definitely distant and moving north from Antarctica by 20 million years ago. Pat then showed the migration of Antarctica (known as the Waltz of Gondwana), using magnetic data, and Antarctica moved from latitudes north of the Equator in the late Precambrian to its present position over a period of 600 million years.

The Waltz of Gondwana.

The evolution of Antarctica's fauna and flora and its links with Australia was the next focus of attention. While the modern flora and fauna of Antarctica are clearly different from Australia, with only two flowering plants in Antarctica and penguins and seals unique to Antarctica, there was greater resemblance in the past. *Nothafagus beardmorensis*, 2-3 millions old (with beech-like leaves) is found as a fossil located at 86° S at 1800 m above sea level. In Tasmania, there is a *Nothafagus gunnii*, located at 42° S.

Pat took the audience in an unusual direction with the next topic – that of the use of Antarctica as a model for human communities, *i.e.*, the effects of isolation, and physiological responses- for instance, the study of antibody responses to bacteriophage φX-174 in humans exposed to the Antarctic winter-over as a model for space flight.
Meteorites- macroscale and microscale (some 0.2 Mm diameter). Pat showed that some 65-70% of the world’s meteorites were found mostly in the Australian territory of Antarctica. Micrometeorites were sedimented onto the adjoining seafloor. The sedimentation of such micrometeorites and incorporation into the sedimentary record was one of impact on the ice, the slow movement of ice towards the sea, the break-up and of the ice sheet, and with melting of the icebergs, the deposition of the meteoritic material on the sea floor.

The Antarctic has resources and (human) global functions. In terms of resources, it harbours krill, the Patagonian Toothfish, other finfish, whales, seals, and penguins. Pat explained the resource exploitation in terms of tonnage captured of krill, Patagonian Toothfish, other finfish, and whales over the period 1969-2002, and the harvesting of various whale species over a 70-year period. The peaks in biomass exploitation related to various social-political and economic factors, e.g., the collapse of the USSR had an effect on krill harvesting. Pat then showed that for the Southern Ocean while biomass for fauna > 1 cm in size was ~ 500 x 10^6 tonnes, the biomass for phytoplankton (dinoflagellates, diatoms, coccoliths), protozoa (amoeboids, foraminifera etc) and bacteria account for 8300 x 10^6 tonnes.

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<tr>
<td>Penguins</td>
<td>0.8 x 10^6 tonnes</td>
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<td>Whales</td>
<td>5 x 10^6 tonnes</td>
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<td>Seals</td>
<td>10 x 10^6 tonnes</td>
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<td>Squid</td>
<td>40 x 10^6 tonnes</td>
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<td>Fish</td>
<td>100 x 10^6 tonnes</td>
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<td>Salps</td>
<td>100 x 10^6 tonnes</td>
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<td>Krill</td>
<td>100 x 10^6 tonnes</td>
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<td>Copepods</td>
<td>150 x 10^6 tonnes</td>
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<td>TOTAL</td>
<td>505.8 x 10^6 tonnes</td>
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The Antarctic also now has a growing tourist industry, and functions as a global observatory (for instance, it recorded the nuclear test detonated in Pakistan in 1998). It also has had an impact culturally, though the issue of stamps, art, and photography.

Pat went on to outline the Antarctic Treaty systems, and their usefulness. The Antarctic Treaty System was perhaps the greatest result. It applies south of 60°S (not sub Antarctic), and involves consensus decision-making. Its objectives for Antarctica are:
1. Peaceful purposes only (i.e., no military activities, and no nuclear testing or storage),
2. freedom of scientific activities as occurred during International Geophysical Year,
4. free exchange of scientific data,
5. territorial claims put on back burner,
6. no new claims; no influence on existing claims,
7. observation scheme, and
8. formal exchange of information.

The original twelve in this endeavour were: Argentina, Australia, Belgium, Chile, France, Japan, New Zealand, Norway, South Africa, USSR, United Kingdom, and the USA. Other Treaty instruments include CCAMLR, [CRAMRA], COMNAP, and Protocols on environmental protection (SCAR).

Pat summed up the significance of Antarctica globally in several closing thoughts: Antarctica affects our everyday lives, it is of great international diplomatic value, its scientific value will increase, its economic value will grow, its greatest value will be inspirational, and the biggest impact on it will come from what we do.

The presentation was followed by questions, and then tea and refreshments.
Nominations for The Medal Of The Royal Society of Western Australia

Nominations are called for candidates for the Medal of the Royal Society of Western Australia to be awarded in 2010. Nominations should be confidential, and information about the candidate (curriculum vitae and short biography) should be forwarded to the RSWA President Dr Lynne Milne, c/- The Western Australian Museum, Locked Bag 49, Welshpool DC 6986. Applications should reach RSWA before April 30th 2010.

The Royal Society of WA Library is held at the WA Museum, 49 Kew St Welshpool

Email: RSWA@museum.wa.gov.au  
Phone: 9212 3771  
Facsimile: 9212 3882

View the Joint RSWA WAM Online catalogue at:  

2010 IASP-ASPA Joint Conference: Science and Technology Parks.

Burswood Convention Centre, 
Wed. 24th - Friday 26th Nov. 2010

The theme, highly relevant in today's challenging, ever-changing world, is The Asia-Pacific Region's Innovation Hot Spots - Opportunities for Sustainable Collaboration. The Western Australian Government, as host, is pleased to provide a program of interesting, challenging and informative sessions which will feature stimulating keynote speakers, presentations and discussions. To register your interest in attending, submitting an abstract or sponsoring

https://www2.iceaustralia.com/esi/getdemo.ei?id=150 &s= 4QC0Z2LFN> or for more information: 
www.iceaustralia.com/2010iasp-aspa

Energising WA Conference, Perth, 22 - 24 March 2010

The world is changing and Australia must respond to climate change with actions that reduce greenhouse gas emission emissions and that will deliver a more competitive, more sustainable Australian economy, that will ensure the quality of life of Australians, and shift global reliance from fossil fuels to renewable energies. These changes will create new jobs, new businesses, and new investment opportunities, all of which will need new ideas from science, new solutions from engineers, and support from the whole community.

For further conference details and registration.  
www.energisingwa.com.au

Geological Society of Australia  
(WA Division)

5:30 Wednesday, 5th April  
Nick Timms
Department of Applied Geology, Curtin University of Technology

Controls on gold mineralization in the Murchison Province: Implication for the evolution of the Yilgarn craton from mapping macro- to microstructure, geochemistry and geochronology.

Venue: The Irish Club, 61 Townshend Rd, Subiaco

The GSA (WA) meets on the first Wednesday of each month (except December and January) For the Abstract of Nick’s talk: 
http://www.wa.gsa.org.au/
The Australian Government awards five prizes annually for outstanding scientific achievements and excellence in science and science teaching. These awards are the most prestigious and significant of their kind in Australia. Each award comprises an embossed medallion, with matching lapel pin in jarrah presentation case, and cash prizes totaling A$500,000.

The five award categories include:
* The Prime Minister's Prize for Science;
* The Malcolm McIntosh Prize for Physical Scientist of the Year;
* The Science Minister's Prize for Life Scientist of the Year;
* The Prime Minister's Prize for Excellence in Science Teaching in Primary Schools; and
* The Prime Minister's Prize for Excellence in Science Teaching in Secondary Schools.

The Department is currently seeking nominations for these awards, which are open to Australian citizens or those who hold permanent residence status in Australia. Nominations should be made by nominators who are personally knowledgeable of the nominated person's achievements and who can offer expert opinions on its worth. Self nominations will not be considered.

A nominations kit providing information on the awards and detailing the nominations procedure is attached, and further information can be found at: http://www.innovation.gov.au/scienceprizes

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**Physics Around the Country**

The March bulletin includes information on:
AIP events across the country,
AIP 2010 Congress
International Conference of Nanoscience and Nanotechnology,
The Global Survey of Physicists is still open and collecting responses!
Science prizes,
Physics activities across the country.
Physics conferences
More details are available at <http://www.ausnano.net/iconn2010/>

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**Issue 21 of The Planning Diary newsletter: December 2009**

This Issue includes an article on WA's newest marine park, the Walpole and Nornalup Inlets Marine Park, and provides updates on the progress of management plans for a number of areas.

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**The Australian Natural History Medallion - Call for Nominations**

The Australian Natural History Medallion is awarded annually in recognition of services to Australian natural history during the previous ten years

Any person shall be eligible for the Award who, within the preceding 10 years, has increased popular and/or scientific knowledge of Australian natural history (biological or physical)

Nominations for the award may be made by natural history societies, closing the 1st May 2010. For more information, and nomination forms: www.fncv.org.au/medalion.htm

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**Parks and Reserves of Yanchep and Neerabup Draft Management Plan**

The Conservation Commission of Western Australia released the *Parks and Reserves of Yanchep and Neerabup Draft Management Plan* on 8th March for public comment.


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This space will be updated each month in order to provide RSWA members and guests with a calendar of up-coming events which will include ordinary monthly meeting, and special events such as Public Forums, Symposia, and excursions. *Watch this space!*

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<tr>
<th>Date</th>
<th>Time</th>
<th>Venue</th>
<th>Event</th>
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<tbody>
<tr>
<td>April 11th</td>
<td>9 am</td>
<td>Muderpup rocks, Cottesloe car park</td>
<td>Joint RSWA/Naturalist Club Excursion: Modern and Pleistocene rocky</td>
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<td></td>
<td></td>
<td>(between Forrest St and Pearce St)</td>
<td>shore ecology</td>
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<td>May 17th</td>
<td>7 pm</td>
<td>TBA</td>
<td>Dr Patrick Armstrong – 'Darwin, Australia, and Luck', and launch of</td>
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<td>RSWA Special Issue on Evolutionary Biology</td>
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<td>June 21st</td>
<td>7 pm</td>
<td>TBA</td>
<td>Leeuwin Current Special Issue Book Launch TBC</td>
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<td>July 19th</td>
<td>7 pm</td>
<td>Woolnough Theatre</td>
<td>AGM and Medal presentation</td>
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<td>August 14-22nd</td>
<td>TBA</td>
<td>Scitech 16th August Bunbury 18th August Karratha 20th August Pt Hedland 21st August</td>
<td>Science Week Event Biodiversity and climate change Biodiversity of</td>
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<td>Leschenault Peninsula and Inlet Biodiversity in the Pilbara region</td>
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<td>Mangroves of Port Hedland</td>
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<td>September</td>
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<td>Post-graduate Symposium</td>
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<td>October 18th</td>
<td>7 pm</td>
<td>Scitech</td>
<td>Alec Coles: new CEO of WAM</td>
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<td>A vision for the Western Australian Museum</td>
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<td>November 15th</td>
<td>7 pm</td>
<td>Kings Park</td>
<td>Dr Phil Playford: The Devonian Reef Complexes</td>
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<td>December TBA</td>
<td>TBA</td>
<td>Herdsman Lake</td>
<td>Joint RSWA/ Naturalists Club Xmas function</td>
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**Map showing location of excursion meeting place at Muderup Rocks**

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