

LINNEAN SOCIETY OF NEW SOUTH WALES

LINN S'O'C' NEWS

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INCLUDED WITH THIS ISSUE

Membership renewal form

NEW MEMBERS

We welcome our new member:

Mr. Rolf Rebner of Coolatai. Fields of interest: botany, paleontology, geology (wide interest).

RENEWAL OF MEMBERSHIP

A form for renewal of membership is included with this newsletter. Please note: you get a discount if you pay before 31 March. If you send a bank transfer, make sure you tell us, or we will receive the money and not know who paid it.

CD OF THE *PROCEEDINGS*

A CD of the *Proceedings* is available to Members at no extra cost, on request. The form for renewal of membership has a box to tick if you want a CD, or you can contact the office at any time.

The *Proceedings* is published on line and may be accessed free of charge by anyone at the website <http://ojs-prod.library.usyd.edu.au/index.php/LIN>

CALL FOR PAPERS

The Linnean Society of NSW and the Australian Speleological Federation are hosting a

SYMPOSIUM ON JENOLAN CAVES

To be held at Jenolan Caves 22-25 May 2013

(Presentations 23 and 24 May)

Papers are invited specifically on Jenolan Caves or any cave-related research that might be applicable to Jenolan Caves.

People interested in presenting a spoken or poster paper should send a proposed title to Mike Augee as soon as possible, but no later than 1 February 2013.

People wishing to attend, whether they plan to present a paper or not, should reply to M. Augee by 1 January 2013 to be on the mailing list for further information.

M.L. Augee
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 89 Caves Road
 Wellington NSW 2820
 02 6845 4294

NEW MICROBIOLOGY RESEACH FUND

The Society has now made available a new research fund, the William Macleay Microbiology Research Fund. The rules are listed in 'Applications for grants...' (below) and are generally similar to those of the Joyce Vickery Scientific research Fund, with the exception that the grant is for microbiology.

APPLICATIONS FOR GRANTS FROM THE SCIENTIFIC RESEARCH FUNDS

Application forms for all Research Funds may be obtained from the Secretary or the Home Page: <http://linneansocietynsw.org.au>

Intending applicants please read instructions carefully. Original plus six (6) copies are required for all of funds.

The date for submission of applications for all the funds is 1st March, 2013.

WILLIAM MACLEAY MICROBIOLOGY RESEARCH FUND

Grants are available from the William Macleay Microbiology Research Fund to support original research in an Australian context within the field of Microbiology.

- Applications will be accepted from postgraduate and Honours degree students at recognised Australian Universities who are undertaking full-time or part-time studies with a microbiological emphasis.
- Applications are also encouraged from amateur or professional microbiologists, whether in employment as such or not, who can demonstrate a level of achievement in original research in Microbiology.

In awarding grants, the Council of the Society will assess:

- The quality of the project
- The applicant's ability to carry it out
- A realistic costing and timetable.
- The likelihood that successful completion of the research will lead to publication.

A grant of up to \$2,300 is available to members of the Linnean Society of New South Wales and \$1,200 is available to non-members of the Society.

The Society envisages that grants would normally be used for items such as travel within Australia, equipment, photographic and other expenses, but not for subsistence, travel to conferences, or thesis preparation.

Applications are not restricted to members, but other things being equal, members of the Society will be given preference.

As a rule, the deadline for applications will be 1st March in any year; however, in exceptional circumstances, applications for emergency support will be received at any time.

Grantees will be required to make a report at the end of the project and to justify their expenditure.

Any publication arising from work supported by the William Macleay Microbiology Scientific Research Fund should include an acknowledgement to that effect.

Any type material generated by studies supported by these grants should be lodged in the collections of an appropriate scientific institution.

Closing date is 1 March, 2013. Submit applications to The Secretary, Linnean Society of NSW, PO Box 291 Manly, NSW 1655

BETTY MAYNE SCIENTIFIC RESEARCH FUND FOR EARTH SCIENCES

The Betty Mayne Scientific Research Fund for Earth Sciences provides financial assistance to support short term original research projects in all aspects of geology.

Applications will be accepted from postgraduate and honours students, amateur or professional

geologists who can demonstrate a level of achievement in original research in Earth Sciences.

Projects proposed for support do not have to be restricted to Australian locations or specimens, but, given the Society's interests in the natural history of Australia, they must demonstrate a strong Australian context.

In awarding grants, the Council of the Society will assess: the quality of the project; the applicant's ability to carry it out; a realistic costing and timetable; and the likelihood that the successful completion of the research will lead to publication.

Applicants need not be members of the Society, although all other things being equal, members will be given preference.

Individual grants will not normally exceed the level of equivalent awards from the Joyce W. Vickery Scientific Research Fund, i.e. \$2,500 for Members and \$1,500 for non-members. Money awarded must be used for research purposes, and field work or travel within Australasia. Requests for subsistence, travel to conferences, or thesis preparation expenses, will not be supported.

The Council will take into account other sources of research funds currently held or applied for by the applicant. While financial support from other sources will not ordinarily exclude award of a grant from the Betty Mayne Scientific Research Fund for Earth Sciences, a grant from this Fund cannot be held concurrently with one from the Joyce W. Vickery Scientific Research Fund.

Applications must be made on the form specific to the Betty Mayne Scientific Research Fund for Earth Sciences. Intending applicants are strongly urged to seek assistance from their supervisor or an appropriate colleague with experience in writing research proposals, and further, to have their application reviewed before submission.

Successful applicants are required to make a written report to the Society no later than 12 months from receipt of their grant, detailing progress of the project, briefly outlining research results, and justifying expenditure of the award money. Any publication arising from studies supported by the Betty Mayne Scientific Research Fund for Earth Sciences must acknowledge that support. Type material, representative sample collections, relevant analytical data, and figured or mentioned thin sections, must be lodged in a state or national museum or university collection.

The Council's decision in regard to the award or non-award of grants from the Betty Mayne Scientific Research Fund for Earth Sciences is final, and no correspondence will be entered into.

Closing date is **1 March, 2013. Submit applications to The Secretary, Linnean Society of NSW, PO Box 291 Manly, NSW 1655**

THE JOYCE W. VICKERY SCIENTIFIC RESEARCH FUND

Grants from the Joyce W. Vickery Scientific Research Fund are intended to support worthy research in those fields of the Biological Sciences that fall within the range of interests of the Society, especially natural history research within Australia.

- Applications will be accepted from postgraduate and Honours degree students at recognised Australian Universities who are undertaking full-time or part-time studies with a biological emphasis.
- Applications are also encouraged from amateur or professional biologists, whether in employment as such or not, who can demonstrate a level of achievement in original research in Biological Sciences.

In awarding grants, the Council of the Society will assess:

- The quality of the project
- The applicant's ability to carry it out
- A realistic costing and timetable
- The likelihood that successful completion of the research will lead to publication.

Individual grants will not normally exceed \$2,500 for Members of the Linnean Society of New South Wales and \$1,500 for non-members.

The Society envisages that grants would normally be used for items such as travel within Australia, equipment, photographic and other expenses, but not for subsistence, travel to conferences, or thesis preparation.

Applications are not restricted to members, but other things being equal, members of the Society will be given preference.

As a rule, the deadline for applications will be 1st March in any year; however, in exceptional circumstances, applications for emergency support will be received at any time.

Grantees will be required to make a report at the end of the project and to justify their expenditure.

Any publication arising from work supported by the Joyce W. Vickery Scientific Research Fund should include an acknowledgement to that effect.

Any type material generated by studies supported by these grants should be lodged in the collections of an appropriate scientific institution.

Closing date is **1 March, 2013. Submit applications to The Secretary, Linnean Society of NSW, PO Box 291 Manly, NSW 1655**

THE OVERVIEW OF EARLY MAMMAL EVOLUTION: THE WHAT, THE WHEN AND THE WHY – a talk by Prof. Mike Archer.

Back in the Permian (about 290 million years ago), there were two main groups of reptiles, the Synapsids and the Sauropsids. There were also the turtles, but we don't know where they fit into this scheme of things. The mammals are descended from the synapsids and the dinosaurs are sauropsids, so we are not descended from dinosaurs, though we may well have had a common ancestor.

The Permian was cold and the 'why' of becoming mammalian comes down to temperature regulation. Animals that could warm up faster and remain warm had an advantage over the slower cold-blooded ones. The synapsids had some means of keeping warm: one group had vascular sails on their backs that were good for warming up when basking in the sun. The mammal-like reptiles were good at keeping warm and were the dominant group. Some of them grew to a large size. At this time, the synapsids were the fearsome carnivores, not the sauropsids.

It seems major evolutionary leaps are always made by the carnivores. Herbivores just munch away mindlessly at the vegetation while the carnivores have to be smart to catch dinner ('Archers's –be it ever so humble – law of Evolutionary Leaps'). At this point, Prof. Archer warned that vegans and vegetarians should take note! The fearsome synapsids were clearly headed for global dominance. The Permian was followed by the Triassic and a warmer climate: it was 10° hotter. Now, being warm-blooded became a liability and the cold-blooded sauropsids had the upper hand, becoming the large dinosaurs. The synapsids coped with this change in two ways: they became smaller and nocturnal, becoming active at night when it was cooler. By the mid Triassic, the synapsids included tiny mammals.

Mesozoic mammals in the fossil record had been overlooked because everyone was looking for the big dinosaurs. Now when they go back and sift through the spoil where the large dinosaurs occur, they find plenty of small mammals: shrew-like creatures, some even the size of a paper clip, to animals the size of a Tasmanian devil that ate small dinosaurs. They occupied all the habitats that mammals occupy today. There were diggers, burrowers, swimmers, gliders, wombat-like creatures, squirrel-like and rodent-like early mammals. Many of these early mammals were found in China where volcanic ash had settled in a lake and effected amazing preservation. At the end of the Mesozoic, when the asteroid hit the earth and wiped out the dinosaurs, it only knocked out some of the early mammals.

There are a number of key anatomical features that differentiate the synapsids and mammals from the sauropsids and reptiles:

- The synapsids have soft, glandular skin with soft hair. They have sweat glands and mammary glands because of soft skin. The soft skin allows nuanced facial expressions that are important for socialisation.
- Mammals and birds have a 4-chambered heart and double circulation. One side of the heart receives deoxygenated blood from the body and pumps it to the lungs where it is re-oxygenated and comes back to the other side of the heart to be pumped back to the body: a very efficient system. Reptiles have a 3-chambered heart with a single ventricle. Deoxygenated blood is pumped to the lungs from the ventricle and returns to the same ventricle to be pumped to the body. There is thus mixing of the de- and re- oxygenated blood: not as efficient as the double circulation.

The red blood cells of birds and reptiles have a nucleus whereas the red blood cells of mammals have lost their nucleus, presumably so that more oxygen can be packed into the cell.

- Mammals have complicated noses with water recovery structures in the nasal region: a necessity for rapid, hot breathing. Running takes less energy in mammals than in reptiles with their legs out the side of the body.
- Mammals have feet with short toes underneath the body: more efficient than feet with long toes out the side of the body.
- The rib cage shows whether a diaphragm was present or not. Ribs stop at diaphragm if present and extend all along the backbone if not. A diaphragm implies a more rapid and regulated breathing and a higher metabolic rate.
- Evolution of a 'false palate' that divides off the airway from the food pathway. A cleft palate is an incomplete false palate.
- Dental evolution is very complex and is all about blades that meet and cut. A crocodile has teeth that alternate and don't meet. Grinding teeth sharpens them.
- Chewing muscles have become bigger and there are more of them.
- Facial muscles have become more complex and are important for social signalling (smiles, snarls etc., cheek pouches for storing food) and sucking milk.
- Strengthening the jaw to withstand stress. A number of equivalent bones in reptiles are fused to make mammalian jaws.
- More complex middle ear for more acute hearing and better pitch direction. Reptiles only have the stapes in their middle ear. Two small bones used in the articulation of the reptilian jaw have been co-opted to be the malleus and incus, forming a chain of three bones in the mammalian inner ear. Creationist say that could not happen because the animal could not chew while the bones are being reorganised. Bandicoots show how it is done. Baby bandicoots are borne very undeveloped and use a reptilian jaw to grab onto the teat in the mother's pouch. When they open their mouth to let go of the teat some time later, at a fully developed stage, they use a mammalian jaw.
- Mammals cannot excrete uric acid and their kidney structure allows them to produce hypertonic urine
- Warm-blooded mammals carry their testes in external pouches where it is cooler. The engines of reptiles run cooler, so their testes can function inside of their body.
- Mammals produce milk, an ideal food for their young.

