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ABSTRACTS

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**12th Conference on Australasian
Vertebrate Evolution
Palaeontology
and Systematics**

**Sydney
June 2009**



CAUEPS
SYDNEY
2009

**12th Conference on Australasian Vertebrate
Evolution, Palaeontology and Systematics**

Sydney

June 22nd – 25th 2009

Programme

Abstracts

THE UNIVERSITY OF
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CONTENTS

Conference Programme p. 4

Abstracts p. 11

Royal Society of NSW Symposium: Charles Darwin and Darwinian Evolution

(Convenors Michael Archer, Henk Godthelp and Kenny Travouillon)

General Sessions

High School Forum

(Convenors Henk Godthelp, Jacqueline Nguyen and Kenny Travouillon)

Palaeoecology (Convenor Kenny Travouillon)

Human Evolution (Convenor Darren Curnoe)

Posters

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Karen Black	Hayley Bates	Karen White

Conference Programme

Thursday 18th June to Sunday 21st June

Pre-conference Field trip: Jenolan Caves, Canowindra and Wellington Caves (Coordinators Anne Musser, Michael Augee, and Kenny Travouillon)

Monday 22nd June

Registration desk open 8.00- 10.00 am: Foyer inside Central Lecture Block, University of New South Wales.

Venue: Central Lecture Block 6 (CLB 6, D19 on UNSW map)

9.00 **Introductory remarks: Michael Archer and John Hardie**

Royal Society of NSW Symposium: Charles Darwin and Darwinian Evolution

***Student presentation**

Chair: John Long

9.20 **Keynote Speaker: Augee, M.L.** Charles Darwin and Richard Owen: a complex scientific relationship

10.00 **Young, G.C.** Charles Darwin, the geologist, formulated his evolutionary theory because recent developments (age of the Earth; new fossil discoveries), provided the deep time necessary for natural selection to operate

10.20 **Morning Tea**

Chair: Michael Augee

10.50 **Douglas, K.** Professor Owen and the not elephant: armchair travellers in the empires of the dead

11.10 ***Clement, A.** and Long, J.A. Postcranial anatomy of two middle Devonian lungfishes (Osteichthyes, Dipnoi) from Mt Howitt, Victoria

General Sessions

- 11.30 **Warren, A.**, Damiani, R., Northwood, C. and Sengupta, D. P. The importance of scrap
- 11.50 **Long, J.A.** and Trinajstic, K. On the origins of copulatory sexual reproduction in vertebrates: problems with erecting a robust phylogeny
- 12.10 **Trinajstic, K.** and Long, J.A. The potential of X-ray and Synchrotron CT scanning in determining soft tissue anatomy in early vertebrates
- 12.30 **Lunch**

Chair: Anne Warren

- 2.00 **Berrell, R.W.**, Kemp, A. and Salisbury, S. W. Lungfish from the early Cretaceous, Griman Creek Formation of Lightning Ridge, New South Wales, Australia
- 2.20 ***Holland, T.** The internal braincase anatomy of *Gogonasmus* revealed through Micro CT-scanning and the spiracular chamber of tetrapodomorph fishes
- 2.40 **Musser, A.M.**, Luo, Z., Martinelli, A.G., Lamanna, M.C., Weisbecker, V., Wroe, S., and Salisbury, S.W. First Australian non-mammalian cynodont: new evidence for the unusual nature of Australia's Cretaceous vertebrates
- 3.00 **White, A.W.**, Worthy, T.H., Hawkins, S., Bedford, S., and Spriggs, M. Meiolaniid turtle remains from a 3,200 yr BP archaeological site in Vanuatu
- 3.20 **Afternoon Tea**

Chair: Arthur White

- 3.50 **Hocknull, S.** and Beirne, L. Rebuilding a giant, again
- 4.10 **McHenry, C.R.** Cranial anatomy and functional morphology of the Australian pliosaur *Kronosaurus queenslandicus*
- 4.30 ***Herne, M.C.** and Salisbury, S.W. The status of *Leaellynasaura amicagraphica* (Dinosauria: Ornithischia) from the early Cretaceous of south-eastern Australia
- 4.50 ***Leahey, L.G.**, Molnar, R.E. and Salisbury, S.W. *Minmi* and the ankylosauromorph palate
- 5.10 **Salisbury, S.W.**, Agnolin, F.L., Ezcurra, M.D. and Pais, D.F. A reassessment of the Cretaceous non-avian dinosaur faunas of Australia and New Zealand
- 6.00 **Welcoming reception at the Roundhouse, Club Bar, University of New South Wales (E6 on UNSW map)**

THE POTENTIAL OF X-RAY AND SYNCHROTRON CT SCANNING IN DETERMINING SOFT TISSUE ANATOMY IN EARLY VERTEBRATES

¹Kate Trinajstic and John Long

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Key words: Placoderm, Devonian, Synchrotron, Muscle

Vertebrate hard parts are potentially a rich source of information about the biology of the extinct animals. However, established techniques for studying vertebrate fossils recover only a small part of this information and the techniques are also destructive, which severely limits their utility particularly with rare material. Recently, the use of conventional CT scanning has been used because non-destructive “serial sections” can now be produced rapidly and three-dimensional models reconstructed electronically. However, the resolution provided by most conventional CT scanners is insufficient to study histological features. Very recently, the advent of synchrotron CT scanning has been used to visualize subtle texture differences with negligible absorption contrast. Here we present its use to systematically survey, document and reconstruct soft-tissue contacts such as arrested growth surfaces and Sharpey’s fibres. Integral to this project is the fossils from the Gogo Formation in Western Australia as they preserve actual soft tissue structures. Recently small areas of muscle tissue were identified in the placoderm *Eastmanosteus*, which included blood vessels and nerve fibres (Trinajstic *et al.* 2007) and the preserved umbilical cord connecting the embryo of the ptyctodont *Materpiscis* to a yolk sac (Long *et al.* 2008). New discoveries have revealed large areas of phosphatised muscle preserved beneath dermal plates in placoderm fishes. For the first time we can map the postcranial musculature in an extinct placoderm fish. In addition structures interpreted as the heart, liver and abdominal tract have been identified in palaeoniscoid fishes. The excellent 3D preservation in these fossils has provided proof of the synchrotron technique.

LONG, J.A., TRINAJSTIC, K., YOUNG G.C. & SENDEN, T., 2008. Live birth in the Devonian. *Nature* 453, 650-652.

TRINAJSTIC, K., MARSHALL, C., LONG, J. & BIFIELD, K., 2007. Exceptional preservation of nerve and muscle tissues in Devonian placoderm fish and their phylogenetic implications. *Biology Letters* 3, 197-200.

