

INTERNATIONAL GEOSCIENCE PROGRAMME (IGCP)



Annual Report* of IGCP Project No 587 (2012)

IGCP project short title: Of Identity, Facies and Time: The Ediacaran (Vendian) Puzzle

Duration: 5 years

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Date of submission of report: 05 December 2012

Signature of project leader:

Patricia V. Rich

Annual Report

(December 2012)

1. Website address related to the project:

www.geosci.monash.edu.au/precsite

2. Summary of major past achievements of the project:

This is the third year of the project. It followed on IGCP493 and all the reports from this past project can be accessed on the website:

www.geosci.monash.edu.au/precsite

3. Achievements of the project this year only

3.1 Countries Involved. *Saudi Arabia, *Argentina, *Australia, *Canada, *China, *Germany, *India, Iran, Ireland, *Italy, *Japan, *Namibia, The Netherlands, *Poland, *Russia, *Spain, *Sweden, *South Africa, *Taiwan, *United Kingdom, *USA, *Uruguay.

3.2. General scientific achievements and social benefits. A significant number of **research papers** were generated by the participants in this project, some examples of which will be given in 3.6. In addition **four exhibitions** were fielded during 2012: *Great Crises in the History of Life and Wildlife of Gondwana* (with venues in Apollo Bay, Melbourne and Townsville, Australia), *O Mundo Perdido Timor-Leste* (continuing maintenance and training of presenters for the ConocoPhillips sponsored geology exhibition in Dili and two small regional exhibitions in the towns of Aileu and Baucau in Timor-Leste) and the final showing in Melbourne at the Monash Science Centre, Monash University of *The Artist and the Scientists. Upstream/Downstream*. The latter exhibition investigated the flow on use of the scientific art of Peter Trusler, who has crafted many of the art pieces used in publications dealing with Neoproterozoic life. The catalogue for this last exhibition is the book *The Artist and the Scientists. Bringing Prehistory to Life* by Peter Trusler, Patricia Vickers-Rich and Thomas H. Rich, published in late 2010 by Cambridge University Press. Proposed, aided in the planning and production of David Attenborough's *First Life* documentary released in late 2010 by the BBC and Atlantic Productions. The research of two members of IGCP587, Guy Narbonne and Jim Gehling, was featured in this beautiful conclusion of Attenborough's *Life* series

(http://news.bbc.co.uk/earth/hi/earth_news/newsid_9118000/9118606.stm).

This film received 3 Emmy awards for its high quality – perhaps a first for an IGCP project!

3.3. ***List of meetings with attendance and number of countries.***

The principal meeting in 2012 took place in Newfoundland, organized by Guy Narbonne and Galen Halverson in May and early June (see attached meeting form): *Neoproterozoic to Cambrian Evolution of the Earth and Life: A Symposium in Memory of Hans J. Hofmann*. A second field conference was run on the Arabian Shield during January, examining the late Neoproterozoic-Early Cambrian sequences north of Jeddah: Neoproterozoic of the Arabian Shield, organized by Patricia Vickers-Rich and Fayek Kattan.

3.4. ***Educational, training or capacity building activities.***

In the set up and delivery of the exhibitions in both urban and rural Australia and Timor-Leste, opportunities were provided for capacity building in research training and in exhibition outreach training. Each of the exhibitions is equipped with educational materials that are available in many languages and in Timor there has been a concerted effort made, in cooperation with Kirsty Sword-Gusmao, the Prime Minister's wife, to make this available in Mother-tongues, assisting in the transition into schools where the official languages are Portuguese and Tetun, usually not understood by local children. There was a firm presence of IGCP587 with a series of lectures presented at a conference on science communication held in Tehran and sponsored by IRSTM (Iranian Science and Technology Museums)(see attached list of lectures), while several members of IGCP587 presented a series of workshops and lectures at King Abdulla University of Science and Technology in January, addressing the graduate student cohort.

3.5 Participation of scientists from developing countries, and in particular young and women scientists. With the field trip/conference in India and the exhibition activities listed in 3.2 and 3.4 there were a number of women, young scientists and even primary, secondary and tertiary level students involved. In particular, Timor-Leste was a wonderful opportunity to interact with young men and women in a developing country atmosphere. The publication of *O Mundo Perdido Timor-Leste. A Boy and Crocodile Travel Through Time* (now translated into Tetun, Portuguese, English, Chinese, Arabic, Spanish, and Slovenian with Hebrew, Tamil, Farsi, German and French translations underway), the geology of a developing country is centerpoint. This little book is written by the President of Timor-Leste and Nobel Peace Prize Recipient, Jose Ramos-Horta and Patricia Vickers-Rich with art by Peter Trusler and at a primary and secondary level.

3.6. List of most important publications (including maps). Only a few of a considerable number of publications by participants in IGCP587 will be listed due to the constraints of the 5 pages. Also see above.

Book

Vickers-Rich, P. with B. S. Sokolov, 2012 (in press). *The Flight. Boris Sergeevich Sokolov. Natural History and Paleontology in the Changing Landscape of 20th and Early 21st Century Russia*. Paleontological Society of India, Lucknow.

Peer Reviewed Research Papers

- Chen, J., 2012. Evolutionary scenario of the Early history of the Animal Kingdom: Evidence from the Precambrian (Ediacaran, Wengan and Early Cambrian Maotianshan biota, China. In: J. A. Talent, ed., Earth and Life. International Year of Planet Earth, Springer: 239-279.
- Cai*, Y., J. D. Schiffbauer, H. Hua, **S. Xiao**, Preservational modes in the Ediacaran Gaojiashan Lagersttte: Pyritization, aluminosilicification, and carbonaceous compression. *Palaeogeography Palaeoclimatology Palaeoecology*, 326-328: 109-117.
- Cunningham, J. A., C.-W. Thomas, S. Bengtson, S. L. Kearns, **S. Xiao**, F. Marone, M. Stampanoni, P. C. J. Donoghue, Distinguishing geology from biology in the Ediacaran Doushantuo biota relaxes constraints on the timing of the origin of bilaterians. *Proceedings of the Royal Society B (Biological Sciences)*, 279: 2369-2376.
- Fedonkin, M. A., **Vickers-Rich, P.**, Swalla, B. J. & Hall, M., 2012. A new metazoan from the Vendian of the White Sea, Russia, with possible affinities to the ascidians. *Palaeontological Journal*, 46 (1): 1-11.
- Guy, B., Gutzmer, J., **Kaufman, A.J.**, Lin, Y., Fogel, M., and Beukes, N.J. (2012) A multiple-sulfur and organic carbon isotope record from non-conglomeratic sedimentary rocks of the Mesoarchean Witswatersrand Supergroup, South Africa. *Precambrian Research* **216-219**: 208-231.
- Lim, C., Lee, I., Lee, S.-M., Yu, J.-Y., and **Kaufman, A.J.** (in press) Sulfur, oxygen, and hydrogen isotope compositions of precipitation in Seoul, South Korea. *Geochemical Journal*.
- Loyd, S.J., Marenco, P.J., Hagadorn, J.W., Lyons, T.W., **Kaufman, A.J.**, Sour-Tovar, F. and Corsetti, F.J. (2012) Sustained low sulfate concentration in the Neoproterozoic to Cambrian ocean: insights from carbonates of northwestern Mexico and eastern California. *Earth and Planetary Science Letters* **339-340**: 79-94.
- Loyd, Sean J., Marenco, Pedro J., Hagadorn, James W., Lyons, Timothy W., **Kaufman, Alan J.**, Sour-Tovar, F. and Corsetti, Frank A. (in press) Local $\delta^{34}\text{S}$ variability in ~580Ma carbonates of northwestern Mexico and the Neoproterozoic marine sulfate reservoir. *Precambrian Research*.
- Lyons, T. W., Reinhard, C. T., Love, G. D., **Xiao, S.**, Geobiology of the Proterozoic Eon. p. 371-402. In A. H. Knoll, D. E. Canfield, K. O. Konhauser (ed.), *Fundamentals of Geobiology*. Wiley-Blackwell, Hoboken, NJ.
- Meyer*, M., J. D. Schiffbauer, **S. Xiao**, Y. Cai, and H. Hua, Taphonomy of the late Ediacaran enigmatic ribbon-like fossil *Shaanxilithes*. *Palaios*, 27: 354-372.

Narbonne, G. M., **S. Xiao**, J. G. Gehling, and G. A. Shields-Zhou, The Ediacaran Period. p. in press. In F. M. Gradstein, J. G. Ogg, M. Schmitz, and G. Ogg (ed.), Geological Time Scale 2012. Cambridge University Press, Cambridge.

Peng, S., X. Wang, **S. Xiao**, J. Tong, H. Hua, M. Zhu, and Y. Zhao, A call to replace the chronostratigraphic unit Sinian System (Period) with the global Ediacaran System (Period). *Journal of Stratigraphy*, 36: 55-59 (in Chinese with English abstract).

Schiffbauer*, J. D., A. F. Wallace, J. L. Hunter, M. Kowalewski, R. J. Bodnar, and **S. Xiao**, Thermally-induced structural and chemical alteration of organic-walled microfossils: an experimental approach to understanding fossil preservation in metasediments. *Geobiology*, 10: 402-423.

Schiffbauer*, J. D., S. Xiao, K. Sen Sharma, G. Wang, The origin of intracellular structures in Ediacaran metazoan embryos. *Geology*, 40: 223-226.

Xiao, S., A. H. Knoll, J. D. Schiffbauer, C. Zhou, X. Yuan, Comment on Fossilized nuclei and germination structures identify Ediacaran animal embryos as encysting protists. *Science*, 335: 1169c.

S. Xiao, K. A. McFadden*, S. Peek, A. J. Kaufman, C. Zhou, G. Jiang, and J. Hu, Integrated chemostratigraphy of the Doushantuo Formation at the northern Xiaofenghe section (Yangtze Gorges, South China) and its implication for Ediacaran stratigraphic correlation and ocean redox models. *Precambrian Research*, 192-195: 125-141.

*Vickers-Rich, P., Ivantsov, A. Yu., Leonov, M., Kattan, F. H., Johnson, P. R., .. Qubsani, A., Kashghari, W., Al Garni, S. MA., Shamari, A., Barakati, A. A., Kaff, M. H. A., Yazedi, A., Rich, T., Linnemann, U., Hofmann, M., Trusler, P., Smith, J. & Rich, B., 2012. In search of the Kingdom's Ediacarans: The first genuine metazoans (macroscopic body and trace fossils) from the Neoproterozoic Jibalah Group (Vendian/Ediacaran) of the Arabian Shield. *Technical Report*, Saudi Geological Survey (refereed), Jeddah. Submitted, April 2012.

Vickers-Rich, P., Ivantsov, A. Yu, Trusler, P. W., Narbonne, G. M., Hall, M., Wilson, S. A., Greentree, C., Fedonkin, M. A., Elliott, D. A., Hoffmann, K. H. & Schneider, G. I. C., in press (due out Jan. 2013). Reconstructing *Rangaea*. New Discoveries from the Ediacaran of southern Namibia) (**cover article**).

Zelanko, P., Yu, Z., Bebout, G. and Kaufman, A.J. (2012) Early Holocene outburst floods and climate oscillations at Silver Lake, New Jersey. *Palaeogeography, Palaeoclimatology, Palaeoecology* **350-352**: 171-179.

Zhou, C., S.-Y. Jiang, **S. Xiao**, Z. Chen, and X. Yuan, Rare earth elements and carbon isotope geochemistry of the Doushantuo Formation in South China: Implication for middle Ediacaran shallow marine redox conditions. *Chinese Science Bulletin*, 57: 1998-2006.

3.7. **Activities involving other IGCP projects, UNESCO, IUGS or others.** See above for exhibition and publication activities related to/but outside the boundaries of the IGCP. In addition to this many of the participants presented public lectures around the globe, examples including titles such as: *In Search of Ghosts. Trying to Find the First Animals* (Royal Society of New South Wales, Australia), *Reading Rocks – Uncovering the Secrets of Past and Educating* (Singapore Science Centre), *The Wandering Path of a Rock Whisperer* (South Australian Museum, Adelaide and Singapore Science Centre), *The Rise of Animals* (Institute of Paleobiology, Polish Academy of Sciences, Warsaw), etc. See 3.3 for cooperation with IGCP512.

4. Activities planned

4.1. **General goals.** To continue to provide a platform upon which discussion concerning changing environments and climate has affected the evolution of animals and the biota in general. This is being done by organizing a series of meetings and field work globally, concentrating in particular on the youngest and oldest occurrences of the Ediacaran (Vendian) time periods. See website for more specific goals detailed in 8.1 of Aims and Background for this project.

4.2. **Tentative list of specific meetings and field trips.**

5. **Project funding requested:** \$10,000.00 US

6. **Request for extension, on-extended-term-status, or intention to propose successor project.**
Not Applicable

7. **Financial statement (\$ USD only).** See attached

8. **Attach any information you may consider relevant.**

- a. Financial Statement for 2012.
- b. Meeting Report: Neoproterozoic to Cambrian Evolution of Earth and Life (Newfoundland)
- c. Meeting Report: Neoproterozoic of the Arabian Shield
- d. Canadian Group Report (Narbonne)