INTERNATIONAL GEOLOGICAL CORRELATION PROGRAM AUSTRALIA

AUSTRALIAN IGCP NATIONAL COMMITTEE

APPLICATION FOR FINANCIAL ASSISTANCE TO ATTEND IGCP ACTIVITY

Additional information not fully addressed by the checklist of the Australian IGCP committee below.

i) I am member of the Australian IGCP National Committee.

ii) Most of the funds to run this wrap-up field conference will be self-supplied.

1. **THE NAME, DATE AND LOCATION OF IGCP ACTIVITY**

Final field meeting of IGCP 673, The Rise of Animals – 'The Precambrian/Cambrian. Changeover in the Nama Group of Southern Namibia'. This meeting will be centred around the town of Aus, Namibia and will take place from mid-August to the first week in September, 2022.

This 2 week field conference will represent the finalization of more than 2 decades of field research in Southern Namibia. It will be followed by nearly a month with members of the Namibian Geological Survey writing up more than 20 years of research for a summary research paper and a book on this research.

2. THE NAME AND NUMBER OF IGCP PROJECT

IGCP673 The Rise of Animals – The Precambrian/Cambrian Changeover.

3. THE AMOUNT OF FUNDING REQUESTED

$A8000

4. YOUR PERSONAL DETAILS:

Name: Patricia Vickers Rich
School of Earth, Atmosphere and Environment, Monash University, Clayton Victoria, 3800
Telephone: +61 412 230 624. Email: pat.rich@monash.edu

Position in your organisation: Emerita Professor of Palaeobiology

5. **YOUR ROLE IN THE ABOVE IGCP PROJECT**:

Please indicate your involvement in this project's Australian Working Group and supply evidence that you have the support of the project's Australian Correspondent and/or the Project Leader.

PAT RICH
I am the project leader and have led this group this IGCP and previous ones (IGCP493, 587) since 2003.

PETER SWINKELS

Peter Swinkels is both a researcher and technician and used to be Head of Preparation at Museum Victoria. He will undertake the moulding and casting of materials in the field as well in Windhoek. Some of these will be shared with the Namibian Geological Survey; others will be shared between Museum Victoria and South Australian Museum. He will also be responsible for panorama and close-up 3D photography, to be used in research papers and the forthcoming popular book. He is a co-author on some papers from this and previous projects.

Peter will also be in charge of managing specimens and logistics: vehicles, field equipment and maintenance, documenting with Mike Hall, Tom and Pat Rich the data collected.

6. Please describe the major activities of this IGCP Project and the expected outputs. Explain briefly how your activity will benefit Australia in light of current IGCP aims and objectives. Specify any involvement of developing countries in your project or activity for which you seek funding.

IGCP 673 is the wrap-up project of IGCP493 and IGCP587 that have been ongoing since 2003. The main aims of these projects have been to document the biota, the environmental conditions, the palaeogeography for a critical time period in the history of life – the Precambrian-Cambrian Transition some 600-500 million years ago. The ultimate aim has been to study and document the nature of the transition from Ediacara fauna in the latest Precambrian to mobile trilobite fauna at the dawn of the Cambrian in Namibia, at a site where interbedded lavas enable detailed radiometric dating of key sedimentary units and where the transition is now well documented.
Using biota, all of this can then be correlated back to Australia ,with the sequence in the Flinders Ranges, where there is a lack of related lavas and thus precision radiometric dating. Work has been carried out globally for this time period by a large group of collaborators and the focus of IGCP673 has been on this transition in southern Africa.
This trip to Namibia thus has the aims of: 1) having key and final discussions around the rocks with the international protagonists in all three IGCP projects (such as with Dr Alan Jay Kaufman geochemist from the University of Maryland, USA who has been involved in of IGCP493 and IGCP587 projects in Namibia with us there); and 2) organizing the transfer of the accumulated knowledge, such as locations of key fossil sites and age-dating sites, and tectonic settings to a new generation of younger geoscientists. Australian scientists who will be involved, include Les Kriesfeld, Diego Garcia Bellado, Jim Gehling. Interaction with them will tighten the comparison with similar age rocks in the Flinders ranges where the transition is not well dated radiometrically.

Outcomes from this field conference will put the developing country of Namibia on the geological map. We have trained, and are still training, scientists from the Namibian Geological Survey and the Namibian Scientific Society and young Namibian researchers will be attending this conference. Their names have not as yet been indicated but mid-career Namibian researchers Kombada Mopjeni and Helke Moeke will be key parts of the local team.
We are also liaising with locals on the properties to be visited—this has always been of high importance in IGCP Projects 493, 587 and now 673. To this end we have set up local museums (with more work to come on this trip), and as well as displays in Geological Survey of Namibia HQ, and on local farms around Aus and Swakopmund.
These efforts, when completed as a result of this trip, will lead to Namibia benefiting from carefully controlled geotourism.

7. NATURE OF ACTIVITY TO BE UNDERTAKEN AND YOUR CONTRIBUTION

Outline the activity for which you require support, (eg conference, workshop, field workshop, training meeting, production of volume) with documentation showing clearly that it is an IGCP-sponsored activity (e.g., Conference or Workshop website, letter from Project Leader etc). Normally you would be expected to present at least one paper: please attach the abstract and indicate whether it has been accepted (oral/poster). Please be specific how YOUR attending this meeting will help the science (singly or through scientific cooperation), your career, and anything else relevant, so that this can be balanced against disbursal of funds in item 8 below (dots points are preferred).

- This field conference will bring together two decades of research and field activities on the key question concerning the origin of "modern" life on Earth. One of the outcomes of our work in Namibia to date has been the generation of golden spike data for the Precambrian/Cambrian boundary at 538.8 +/-0.2 Ma in the 2022 Geologic Time Scale.
- this meeting will finally enable a DETAILED comparison with other similar age rocks (e.g. the Flinders Ranges, Siberia, Saudi Arabia and Iran). It will address key questions such as was the changeover "coeval" (in geological time) and thus 'instantaneous' or not; and what was the driver of this massive change.
- from the beginning of 2003, these IGCP projects have involved a large number of young scientists from Australia. Several young scientists (Alana Sharp, David Elliott, Corrie Williams, Lydia Low, etc.) have been involved in these projects. Although none will be able to attend this 2022 meeting, which has unfortunately postposed by two years as a result of COVID, we will personally brief them on our return, making sure that there is transfer of knowledge. This will in particular be used in public education with regard to the scientific research occurring globally in the Ediacaran time slot. Les Kriesfeld, in particular, who is just finishing his Ph.D. on Namibian palaeobiology will benefit from this.
- These projects have also been targeting geo-tourism, primary and secondary school curriculum globally. This has led to major exhibitions that in turn have raised funds to support the research, training and geotourism.
- funding will enable me, as project leader, to coordinate the whole field conference. I am responsible for providing all of the funding to make it work.

- Funding will also enable completing the preparation and curation of the materials now housed in the Namibian Geological Survey.
- Funding my presence at the meeting will also allow me to organize a series of research papers and a book, and to personally write a major part of these.
- Detailed research publication of this activity will be submitted by the end of 2022 along with a book submission to Springer.
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8. Provide a realistic total and line item budget for the proposed activity (the cheapest, reasonable airfare should be sought and quoted). This amount is normally greater than the amount requested in item 3.

Airfare funds are sought to attend the last field conference of this project, delayed 2 years by COVID border closures. I am asking for two Premium Economy airfares from Melbourne-Windhoek return currently costed at @ $4000 apiece and so $8000.These are for myself and our retired (but still young!) technician and display 'guru' extra-ordinaire Mr Peter Swinkels. I am asking for Premium Economy because we have to hit the ground running in Namibia and stay healthy for 1.5 months to complete the field components of this IGCP project (and all our linked IGCP projects). We feel that premium economy seating configuration and bathroom facilities will help minimize the risk of catching COVID on the long-haul flight from Melbourne to Africa. We have all had 3 or 4 vaccinations (Pfizer) for Covid, but they only help minimise the chance of catching COVID

If the IGCP is not able to support the Premium Economy seating to keep the distance from others on the long flight from Melbourne to Africa, I will ask for 2 economy airfares and will make up the difference out of my own pocket.

9. Indicate any additional or potential support (to demonstrate that you are actively seeking funds from other sources).

Funding for this conference (with the exception of two airfares) will amount to $A35,000, this being the realistic cost of this 1.5 months field activity in southern Namibia. All this has been raised from my savings, with the exception of some of the field costs provided by the Namibian Geological Survey and participants (e.g. Prof Mike Hall, Monash University, for vehicle support).

Currently I have around $A20,000 to cover two more Premium Economy airfares from Australia to Africa and to cover accommodation, food, and rental of one 4wd vehicle. Another 4wd vehicle is being provided from the personal funds of Prof Mike Hall, and a 3rd vehicle will be provided by the Namibian Geological Survey for their staff members accompanying us as well as their accommodation and food. I have also paid for the research and heritage permits needed for this trip and these have been issued. This cost I paid for personally ($A800).

10. Indicate any previous support (amount and year) from the IGCP Grant-in-Aid. In addition, indicate how that contributed, or was translated through, to new understandings in your field of geology, and any subsequent papers, talks, abstracts, interactions or insights.

2019 $7000 for two field conferences in Australia

2017 $5000 for 5 people, Namibia
2016 $3500 for IGC
2013 $3000 for Namibian Conference (3 people)
2012 $2000 for 40th Anniversary Celebrations in Paris for IGCP
2011 $2500 for Namibian Conference
2010 $1500 for conference in India
2009 $5000 shared between 4 researchers, one being me (location?)
2008 $1500 for IGC, Oslo
2007 $750 for Korean Conference, Asia Pacific Forum on Science Communication
2004 $4500 Namibian conference for Trusler, Vickers Rich and Rich
2003 $6000 White Sea Conference for Trusler, Vickers Rich and Rich - a joint Russian, Australian, Japanese Venture

Publications have been numerous, both research and popular publications as well as documentaries, exhibitions and public education. And this will continue, not only here in Australia but in particular in Namibia where our group trains and educates locals. I attach my latest CV below and on that will be a summary.

11. A condition of all IGCP funding awards is that a copy of published abstract is sent to the committee on conclusion of the travel, together with a summary of your involvement in the meeting. Extracts may be used in the report of the IGCP Australia committee (which may be published in *Episodes*, the flagship journal of the International Union of Geological Sciences), as well as in *TAG*, The Australian Geologist of the GSA. Of course such extracts will not preclude publication of your work elsewhere. In fact we encourage you to publish outcomes of the research you presented, since this is a key measure of how relevant your attendance has been to the aims of the IGCP committee.

Please indicate if you agree with this. I totally agree and have met these requirements over the past 20+ years.

Signed: Pat Rich **Date:** 7 June 2022

Publications and similar activities for 2020-2022:
(T. H. Rich & P. Vickers-Rich)

Books

Rich, T. H. & **Vickers-Rich, P**., **2020.** *Dinosaurs of Darkness*. Indiana University Press, Bloomington: 311pp.

Vickers-Rich, P. & **Rich, T. H**., **2021, 2022.** *43 T-Shirts, Not the Answer to Everything but with a Few Good Guesses*. *A Palaeontological Journey Through 700 Million Years.* New Artworx, Melbourne: 376 pp plus Appendices Data Card. (***both hard and soft copies now available***)

Vickers Rich, P., Rich, T. H., Fenton, M. A. & Fenton, C. L., **2020**. *The Fossil Book. A Record of Prehistoric Life*. Dover, Mineola, New York: 740pp**. *(new edition)***

Vickers-Rich, P. with Rozanov, A. & Rich, T. H., 2022. *The Great Russian Dinosaurs Exhibition. A Russian-Australian Joint Venture (1993-1997) at the time of the Transition from the USSR to the Russian Federation. A Time of Stress in Science.* New Artworx Pty

Ltd, Melbourne. ISBN: 978-0-6487707-8-7. 302 pp. plus data card for appendices. ***(new edition)***

Popular Books and Publications

Rich, T.H., 2022. {*Serendipaceratops*}. P. 138 in Flynn, C. (ed.) *Horridus*: *Journey of a Triceratops.* Museums Victoria, Melbourne, Victoria.

Rich, T. H. & Vickers-Rich, P., 2021. A single fossil bone can tell so much. *Deposits Magazine*, 2021/07/21: 13 pp. (depositsmag.com/2021/07/21/a-single-fossil-bone-can-tell-so-much).

Vickers-Rich, P., 2021. Costa Rica – A riot of biodiversity and complexity. A base for interpreting the past. *Organization for Tropical Studies Newsletter*.

Vickers-Rich, P. & Rich, T. H., 2021-2022. *Dinosaurs on Our Doorstep. Bass Coast of Victoria*. New Artworx, Melbourne: *A Guide to the Exhibitions at the RACV Inverloch Resort and The Hub, Inverloch, Victoria*, 27pp.

Vickers-Rich, P., Trusler, P., Morton, S., Swinkels, P., **Rich, T. H.,** Hall, M. & Pritchard, S., **2021**. Travelling through time. The Roadmap for Namibia is in the rocks. *Deposits Magazine*, 2021/09/15: 24 pp. (*depositsmag.com/2021/09/15/travelling-through-time-the roadmap-is-in-the-rocks*)

Abstracts

Martin, A., **Rich, T.**, Kool, L., Lowery, M., Hall, M, Morton, S., Swinkels, P. & **Vickers-Rich, P**., **2021**. Cretaceous polar arthropods on walkabouts: Newly discovered arthropod trace fossils from the Wonthaggi Formation (Barremian,) Victoria, Australia. *Geological Society of America Meeting*, Abstract 237-14.

Research Papers

Agic, H., Hogstrom, A. E. S., Jensen, S., Ebbestad, J. O. R., **Vickers-Rich, P.,** Hall, M., Matthews, J. J., Meinhold, G., Hoyberget, M. & Taylor, W. L., **Nov. 2021**. Widespread occurrence of organic-walled microfossils *Granomarginata* and flask-shaped *Lagoenaforma* nov. during the late Ediacaran. *Geological Magazine*, Special Volume: DOI: 10.1017/S0016756821001096

Antlej, K., Horan, B., Mortimer, M., Leen, R., Allaman, M., **Vickers-Rich, P.** & **Rich, T., 2020.** Mixed reality for museum experiences: A co-creative tactile-immersive virtual colouring game. *Digital Heritage*.

Antlej, K., Allaman, M., **Vickers-Rich, P.**, **Rich, T**., & Horan, B., **2020**, Inclusive experiences for audiences with a different level of tech-savviness: The design and evaluation of an interactive dinosaur exhibition. In: R Marquis, J Majewski, N Proctor & Z Beth (eds), *Inclusive Digital Interactives: Best Practices + Research*, Access Smithsonian, Smithsonian Institution, Institute for Human Centered Design, MuseWeb, pp. 349-377. ISBN: 978-0-9708358-8-8

Cui, H., Kaufman, A. J., **Vickers-Rich, P**., Kattan, F., Zuo, H., Trusler, P., Smith, J., Ivantsov, A., **Rich, T.,** Kubsani, A. & Yazidi, A., Liu, X.-M., Johnson, P., Goderis, S. & Claeys, P., **2020.** Primary or secondary? A dichotomy of the strontium isotope anomalies in the Ediacaran carbonates of Saudi Arabia. *Precambrian Research*, 343: 1-24.

Duncan, R. J., Evans, A. R., **Vickers-Rich, P**., **Rich, T. H**. & Poropat, S. F., **2021**. Ornithopod jaws from the Lower Cretaceous Eumeralla Formation, Victoria, Australia, and their implications for polar neornithischian dinosaur diversity. *Journal of Vertebrate Paleontology*. DOI: 10.1080/02724634.2021.1946551, vol. 41, no. 3.

Farjandi, F., **Vickers-Rich, P**., Linnemann, U., Hofmann, M., Raveggi, M., Hall, M. & **Rich, T**., **2022**, *in press*. Detrital zircon and and apatite U-Pb geochronology of Ediacaran fossil-bearing strata spanning the late Ediacaran-Cambrian boundary in central Iran. *Alcheringa*.
Flannery, T., **Rich, T. H**., **Vickers-Rich, P**., Ziegler, T., Veatch, G. & Helgen, K., **2022**. A review of monotreme (Monotramata) evolution. *Alcheringa*, 46 (1): 1-18. *https://doi.org/10.1080/03115518.2022.2025900*
Geyer, G., Linnemann, U., **Vickers-Rich, P**., **Rich, T.,** Gartner, A., Ovtcharova, M., Hofmann, M. & Zieger, J. (**2022**, *in advanced preparation*). The Ediacaran-Cambrian boundary interval revisited: An updated record of the Swartpunt section (Nama Supergroup, Namibia) and its significance for the Ediacaran-Cambrian biostratigraphy and faunal turnover. To be submitted to *Precambrian Research*.
Kundrat, M., **Rich, T. H**., Lindgren, J., Sjovall, P., **Vickers-Rich, P**., Chiappe & Kear, B., **2020**. A polar dinosaur feather assemblage from Australia. *Gondwana Research*, 80: 1-11.
Linnemann, U., Hofmann, M., Gartner, A., Gartner, J., Zieger, J., Kraus, R., Haenel, R., Mende, K., Ovtcharova, M., Schaltegger, U. & **Vickers-Rich, P., 2021**. An Upper Edicacaran glacial period in Cadomia: the Granville tillite (Armorican Massif) – sedimentology, geochronology and provenance. *Geological Magazine*, https:// doi.org/10.1017/S0016756821001011.
Pentland, A.H., Poropat, S. F., White, M. A., Rigby, S., **Vickers-Rich, P**., **Rich, T. H**. & Elliott, D. A., **2022**, *in press*. New anhanguerian (Pterosauria: Anhangueria) remains from the Early Cretaceous of Queensland, Australia. *Alcheringa*.
Poropat, S., Pentland, A. H., Duncan, R. J., Bevitt, J. J**., Vickers-Rich, P**. & **Rich, T. H**., **2020**. First elaphrosaurine theropod dinosaur (Ceratosauria Noasauridae) from Australia – a cervical vertebra from the Early Cretaceous of Victoria. *Gondwana Research*, 84: 284-295.
Rich, T. H., Flannery, T., Evans, A. R., White, M., Ziegler, T., Maguire, A., Poropat, S., Trusler, P. & **Vickers-Rich, P.**, **2020**. Multiple hypotheses about two mammalian upper dentitions from the Early Cretaceous of Australia. *Alcheringa*. *An Australasian Journal of Palaeontology*, 44 (4): 1-9. https://doi.org/10.1080/03115518.2020.1829042
Rich, T.H., Flannery, T.F., **Vickers-Rich, P**. **2020**. Evidence for a remarkably large toothed-monotreme from the Early Cretaceous of Lightning Ridge, NSW, Australia. In*:* G. V. Prasad and R. Patnaik (eds.*), Biological Consequences of Plate Tectonics:New Perspectives on Post-Gondwana Break-up—A Tribute to Ashok Sahni, VertebratePaleobiology and Paleoanthropology* © Springer Nature, Switzerland: 77-81.

Rich, T.H., Krause, D. W., Trusler, P., White, M.A., Kool, L**.** Evans, A. R., Morton, S. & **Vickers-Rich, P**., **2022**, *in press*. Second specimen of *Corriebaatar* (Early Cretaceous, Australia) confirms multituberculate affinities. *Acta Palaeontologica Polonica* 67 (1): 115-134.

Rich, T. H., Lowery, M., Hall, M., Kool, L., Bevitt, J., White, M. & **Vickers-Rich, P., 2022** in advanced preparation (submitted in **May 2022**). A Note on a 2nd Cretaceous mammal locality found along the Bass Coast of Australia. *Alcheringa.*

Rich, T.H., *Trusler, P, Kool, L., Pickering, D., Evans, A., Siu, K.,* Maksimenko, A., Kundrat, M., Gostling, N.J., Morton, S., **Vickers-Rich, P**., **2020**. *A third, remarkably small, tribosphenic mammal from the Mesozoic of Australia.* In*:* G. V. Prasad and R. Patnaik (eds.*), Biological Consequences of Plate Tectonics:New Perspectives on Post-Gondwana Break-up—A Tribute to Ashok Sahni, VertebratePaleobiology and Paleoanthropology* © Springer Nature, Switzerland: 67- 75.

Vickers-Rich, P., Mhopjeni, K. & Schneider, G., **Rich, T.H.** with *et al*., **2020**. Crossing the Line. The Ediacaran-Cambrian transition in Southern Namibia. How the world began to change @ 538 million years ago. *Scientific Society Swakopmund, Reports*, 52 (1): 2-25.
Wagstaff, B. E., Gallagher, S. J., Hall, W. M., Korasidis, V. A., **Rich, T. H**., Seegets-Villiers, D. E. & **Vickers-Rich, P**., **2020**. Palynological-age determination of Early Cretaceous vertebrate-bearing beds along the south Victorian coast of Australia and implications for the spore-pollen biostratigraphy. *Alcheringa*. https://doi.org10.1080/03115518.2020.1754464.

Popular Books for Children

Ramos-Horta, J. & **Vickers-Rich, P**., **2018-2022**. *O Mundo Perdido de Timor Leste.* Ten additional books published – those in **Bahasa Indonesian, Bahasa Malay, Bengali, Tamil, Japanese, Italian, Polish, Nepalese, Thai, Greek** and available in more than 24 languages on the palaeontological history of Timor-Leste. These books were funded by the Governments of Timor-Leste, China, UNESCO, Swinburne University of Technology (Melbourne), as well as by private donations and volunteer translators. Published through New Artworx and PrimeSCI!, Melbourne. A copy of each of these editions has been downloaded onto more than 100 data sticks and sent to libraries around the world. Over the years more than 2 million copies of the 24 languages have been distributed and further translations are pending and underway.

Updates and Translations Published in 2020-21:

Ramos-Horta, J. & **Vickers-Rich, P**., **2020.** *O Mundo Perdido Timor Leste. A Boy and a Crocodile Travel Through Time*. PrimeSCI!, Swinburne University of Technology, Melbourne and New Artworx, Melbourne: 31 pp. ISBN 978-0-6487707-2-5.

Ramos-Horta, J. & **Vickers-Rich, P**., **2020**. *Un mondo scomparso. Un ragazzo e un coccodrillo viaggiano nel tempo*. Translator, S. Grippi. NewArtworx, Melbourne: 31 pp. ISBN 978-0-6482680-8-6 (Italian)

Ramos-Horta, J. & **Vickers-Rich, P**., 2020. *東ティモールの「失われた世界」少年とワニの時間旅行*. Translator, Dr Shin-ichi Sano, University of Toyama, Japan. Monash University and NewArtworx, Melbourne: 31 pp. ISBN 978-0-6487707-1-8 (simple version). (Japanese)

Ramos-Horta, J. & **Vickers-Rich, P**., **2020.** *東ティモールの「失われた世界」少年とワニの時間旅行*. Translator, Dr Mari Kamitani, University of Kyoto, Japan. PrimeSCI! Swinburne University, Melbourne and NewArtworx: 31 pp. ISBN 978-0-6487797-3-2 (Japanese)

ΧΟΣΕ ΡΑΜΟΣ-ΧΟΡΤΑ και **ΠΑΤΡΙΚΙΑ ΕΙΚΟΝΕΣ-ΠΛΟΥΣΙΟΣ**, **2021.** *Ο Μούντο Πέρντιδο Τιμόρ-Λέστε Εικόνες Πίτερ Τρόσλερ Ένα αγόρι και ένας κροκόδειλος Ταξιδέψτε στο χρόνο.* Translators Antonios Nteventzis and Konstantinos Nteventzis. PrimeSCI! Swinburne University of Technology, Melbourne and NewArtworx: 31 pp. ISBN978-0-6487707-2-5, complex version. (Greek)

*And in **2022** new translation in Serbian language in progress.*

Honourary Positions/Awards

Honourary Director, PrimeSCI! Swinburne University of Technology, Wantirna Campus, Melbourne, Australia. As a provider of science lessons from primary-aged school children, this group has continued to deliver online lessons during the Covid-19 pandemic

and many of the programs developed in the last 12 months are of ongoing value, even after face to face education has resumed. Zoom presentations have been significantly popular and used by schools in Victoria and nationally. Some of the programs developed by Vickers-Rich for Timor-Leste have also been used online for its local audience with the main presenter being Jose Ramos-Horta, previous and new President of Timor-Leste in **2022**. **(P. Vickers-Rich)**

Appointed to UNESCO International Geosciences Program IGCP Board, **2020-2022**, Theme Group Global Change, Paris. **(P, Vickers-Rich)**

Continuing Position as Member of the Australian UNESCO IGCP Committee, **2020 – on going**. **(P. Vickers-Rich)**

Committee Member, Friends of Aileu, Timor-Leste, **2020-2022 – ongoing**. **(P. Vickers-Rich)**

Elected for Foreign Membership in the Russian Academy of Science by the Paleontological Institute, Moscow, **June 2022**. **(P. Vickers-Rich)**

ACNS Neutron Beam Instrument Time – Approved. Neutron tomographic analysis of a Southern polar ornithopod dinosaur. "Noddy" NMVP21553. Joint project: S. Poropat, J. Bevitt, R. Duncan, **T. Rich, P. Vickers-Rich**, plus further specimens scanned. **2020-2022** approved and carried out. Proposal to scan several specimens of turtles from the Early Cretaceous of Victoria with J. Bevitt, T. Rich, P. Vickers-Rich & L. Kool successful and carried out in **early 2022**.

Managing Director of four Science Museums in Timor-Leste (Dili at the Xanana Gusmao Cultural Centre; Aileu and the Aileu Regional Library in cooperation with the Maryknoll Catholic Sisters; and in Baucau at the Selesian Brothers who manage programs in science education). Working with several groups, including UNICEF, UNESCO and Nobel Laureate Jose Ramos-Horta, the supply of materials, educational programs and funding I have been able to keep these three facilities as well as a small exhibition at the Presidential Palace in Dili functioning for over a decade, and **this continued in 2022 and ongoing**, serving the community with an emphasis on Primary and Secondary schools throughout Timor-Leste. Funds raised to further support staff salaries at the Dili venue in 2021-**2022**. **(P. Vickers-Rich)**

Projects

Fieldwork planned for the Ediacaran-aged (550-600 million-year-old) rock sequences in southern Namibia had to be delayed during the Covid-19 lockdown until **2022**. The grant for 2020 to **Vickers-Rich & T. H. Rich** covering this work from UNESCO for IGCP Project 673 has been extended into **2022** by UNESCO, and a second grant for $US5,000 was awarded for work in 2021 and that too has been extended to 2022. Fieldwork now expected to take place in **Auguat-September 2022** in southern Namibia.

Prospecting of the Bass Coast has increased the number of dinosaur ichnites from there from two to 144 in just two years through the efforts of Melissa Lowery working in concert with **T. Rich and P. Vickers-Rich**. In addition, Lowery has recovered many small bones including the first mammal, a partial dentary of *Ausktribosphenos* from only the second site on the Bass Coast to yield a Cretaceous fossil mammal. **Ongoing in 2022** and funded by private donations**.**

Major mapping/field conference took place in May 2022 led by Dr Tony Martin, Dr Mike Hall, Dr Tom Rich and Dr Patricia Vickers Rich and funded by Swinburne University and Volunteer Funds for the Dinosaur Dreaming project.

Field Work & Committee Work

With the issuance of a work permits from Swinburne University and Monash University, **P. Vickers-Rich** was able since August to oversee a group of experienced volunteers along the Bass Coast to recover a significant collection of fossilized footprints from a variety of

dinosaurs and invertebrates and a number of skeletal remains of amphibians, turtles and other reptiles including dinosaurs (via moulding each) as well as possible mammals, which are now under preparation, again by volunteers in the Gippsland area. This has been critical to the recovery of material in these Early Cretaceous (120-130 million-year-old) rock sequences that crop out on the wave savaged coast. **Vickers-Rich** is the Chief Research Permit Holder from Parks Victoria along the Bass and the Otway coasts; this work is **ongoing in 2021 and into 2023. Permit valid until mid-2023**: Permit No. 10009432. (**P. Vickers-Rich & T. H. Rich**)

P. Vickers-Rich & T. H. Rich are consulted by the Advisory Committee for the development of the afore-mentioned **Polar Dino Trail**, which highlights such discoveries, along the Bass Coast – **ongoing in 2021 into 2022.**

P. Vickers-Rich and Dr T. Rich are on the Advisory Committee for the construction of a museum in Inverloch that concentrates on the history of this region from the Cretaceous to Present and includes participants from the Bunurong People, the Inverloch Historical Society, south Gippsland Conservation Society (Bunurong Environment Centre), the Inverloch Shell & Marine Display Museum and the Dinosaur Dreaming Project, **ongoing into 2022**.

Lectures (2020-2021) (a selection but not exhaustive)

Lion's Club, Wheelers Hill, Dinner Lecture - via Skype. (*Victorian Polar Dinosaurs: What Did They Eat – Come to Café Cretaceous!*) **25 August 2020**. **(P. Vickers-Rich & T. Rich)**

Lion's Club, Wheelers Hill, Dinner Lecture – in person. (*The Making of the DinoQuest Exhibition, 2019 Science Centre Singapore*). **27 April 2021**. **(P. Vickers-Rich & T. Rich)**

Lion's Club, Leongatha – in person. (Dinosaur Dreaming Project), scheduled for **August 2021**. (**Delayed until 2022**). **(T. Rich & P. Vickers-Rich)**

LabRats Presentation via Zoom together with Dr Peter Trusler (palaeoartist) and Stephen Pritchard (documentary producer) on *Reconstructing the World of the Victorian Polar Dinosaurs* – in research, in art and in documentary **October 2020 and continued in 2022** – via *Zoom and hopefully in person in 2022*. **(P. Vickers-Rich)**

History of Life from the Precambrian to Modern, 2020 – 3 lectures presented at Monash University, School of Earth, Atmosphere and Environment, for 3rd year course in Palaeobiology, led by Prof Jeff Stilwell – via *Zoom.* **(P. Vickers-Rich)**

Another lecture is scheduled on the **Victorian Dinosaur research** and field work with the Warringal Conservation Society for **November 2022 (P. Vickers-Rich, T. H. Rich)**.

The history of discovery and research on the new Victorian State Fossil Emblem, *Koolasuchus cleelandi*, a joint lecture by **T. H. Rich** and Anne Warren at Museum Victoria, **April 2022**.

Radio Interview

2 December 2021. **Interview with David Astle ABC** night radio re: the dinosaur *Stegororus* just reported from Cretaceous of Chilean Patagonia (**Tom Rich**).

14 January 2022. Interview with Jerod Whitaker, ABC Gippsland re: Announcement of *Koolasuchus cleelandi* for the Victorian State Fossil Emblem (**Tom Rich**).

15 April 2022. **Madeline Buckley, Interview for 2SER Radio** About Mammals from Antarctica. **2SER Sydney** (**Tom Rich**).

Exhibitions

***O Mundo Perdido Timor-Leste. The Long History of Timor-Leste – Permian to Present*, 2020 and ongoing**. Launched at the Xanana Gusmao Cultural Centre, **Dili, Timor-Leste** in January 2018, the exhibition is permanent and curated by locals. Two further Regional

Exhibitions in the highland village of **Aileu** (in cooperation with the *Friends of Aileu* [Moreland City Council, Melbourne], the *Public Library of Aileu* and the *Maryknoll Catholic Sisters*) and another at the Catholic *Salesian Brothers* Compound in **Baucau** were upgraded, and the exhibitions are **ongoing in 2021**. Webinars were developed in 2020 centered on the reading of the Tetun version *of O Mundo Perdido Timor-Leste* by Past Prime Minister and President of Timor-Leste, Jose Ramos Horta during the on-line school presentations (**P. Vickers-Rich**). Funding for these continues to be provided by **P. Vickers-Rich, the Friends of Aileu and UNESCO National Commission for Timor-Leste. All programs ongoing in 2022.**

DinoQuest, the Dinosaurs of Darkness. A cooperative exhibition of the Singapore Science Center, Singapore, DigiMagic, Dezignformat and P. Vickers-Rich, launched in Singapore and on show from **May through to September 2019**. More than 200,000 visitors attended this expo in Singapore, and it was extensively used by school groups and for special events. Content included not only dinosaurs and their companions but also the life existing from the Precambrian to the modern day, more than 3 billion years of history on Earth. The publicity generated by this expo was estimated to be in excess of $1,000,000. Currently the Science Centre Singapore, DezignFormat, DigMagic, along with **P. Vickers-Rich,** are developing an online version of this expo with plans for **release in 2022**. The original expo is in storage at the Singapore Science Centre and negotiations are underway with venues in China, Japan, Australia, Sarawak and New Zealand to resume travel, once worldwide lockdowns have been lifted. The funding from this and other exhibitions is directed to support research both at Swinburne University and Monash University, Melbourne, including that of students. **(P. Vickers-Rich & T. Rich)**

Little L. A Virtual Reality Experience regarding the ongoing field research into the Cretaceous of Polar Victoria and the polar dinosaurs that have been discovered by palaeontologists from Monash University, Swinburne University of Technology and Museums Victoria, working in concert on the VR and exhibition with a team from Deakin University, Geelong. On show at the National Wool Museum, Geelong from late **2017 through March 2018, negotiations are in 2022 presently underway** between Deakin and the Science Centre Singapore to enhance and use this exhibition in an international program. Furthermore, the VR Experience may also be used for docos regarding the discoveries along the Bass Coast with the Bass Coast program to construct a Bunurong Polar Dinosaur Trail for public education. (**P. Vickers-Rich & T. Rich with Kaja Antlij and Ben Horan at Deakin University and the Bass Coast Council**)

What Happened to Australia's Megafauna? A joint project with **Ecolink in Bacchus Marsh**, Victoria has involved installation of an exhibition with the large dromornithid bird, *Bullockornis*, a member of the now deceased megafauna that characterized the late Cenozoic of Australia. Along with the installation of this skeleton, PrimeSCI! has provided educational materials crafted over the last two decades for use in both Primary and Secondary schools. The exhibition offers an opportunity for the training of Tertiary students in science communication, centred around Australia's and global megafauna and the reasons for its demise. This is an **ongoing association from 2020 into 2022** to develop programs for public education (**P. Vickers- Rich & T. Rich**).

Polar Dinosaurs – the Dino Dreaming/Dinosaurs on Our Doorstep Project. Polar Dinosaurs from the Early Cretaceous of Victoria. Three exhibitions, one at the RACV Inverloch Resort and a second at the Cape Otway Light Station along with a new one installed at The Hub, Inverloch in **2022** with funds raised from private donors. **Ongoing in 2022 and beyond, maintained and updated by P. Vickers-Rich & T. Rich)**

<u>Grants Awarded/Field Conferences Organized</u>

Field Workshop – Precambrian-Cambrian Boundary, Ediacara Biota Snowball Earth Deposits and the Geology of the Nama Basin around Aus (Southern Namibia), planned for March-April 2020. Although **Vickers-Rich & Rich** spent three weeks in March on-site preparing for the arrival of conference participants in late March 2020 – the trip had to be cancelled because of the Covid-19 outbreak**. The field conference has been postponed until September-October 2022**. Leaders: **Pat Vickers-Rich, T. H. Rich** & Mike Hall and in cooperation with the Namibian Geological Survey. *Part of UNESCO IGCP673 project.*
The End of a Supereon – Winners and Losers at the Precambrian-Phanerozoic Transition. UNESCO International Geosciences Programme IGCP673. A follow-on project with the opportunity of 5 years funding from both the International and the National IGCP Committees, with 97 participating researchers from 27 countries. This project follows on from IGCP Projects 493 and 587 – which were chosen at the 40th Anniversary of this UNESCO Programme as two of the top 40 of more than 600 projects over the funding of this programme. The focus of this project is the biotic change from 550 to 535 million years ago, best recorded in the sedimentary sequences of southern Africa. As a result of pre-COVID-19 lockdown activities in **March 2020**, links with the ***Namibian Scientific Society's Museum in Swakopmund resulted in PVR setting a program in motion to revise the palaeontology section in the Namibian Scientific Society Museum.***, Plans were generated for further exhibition work there and at another smaller regional museum in the Aus region to the south, near where much of the Ediacaran-aged fossil material has been discovered since the early 1900's. Vickers-Rich, in cooperation with Dr Gabi Schneider, past Director of the Geological Survey of Namibia, was able to fully revise and add to the Palaeontological exhibition in the Swakopmund Museum and further additions were **initiated in 2020 and this project is ongoing into 2022.** Already mentioned above. **(P. Vickers-Rich & T. H. Rich)**
Fieldwork planned for the Ediacaran-aged (550-600 million-year-old) rock sequences in southern Namibia had to be delayed during the Covid-19 lockdown. The grant for 2020 to **Vickers-Rich & T. H. Rich** covering this work from UNESCO for IGCP Project 673 has been extended into 2022 by UNESCO, and a second grant for $US5,000 was awarded for work in 2021 and that too has been **extended to 2022 in cooperation with the Namibian Geological Survey.**

Documentaries

At the request of the UNESCO International Geosciences Committee (Paris), a 1.5-minute documentary of my team's research carried out on IGCP673 was produced by doco maker Steve Pritchard in **2019-2020**: *From Biotic Weirdness to the Modern World*, and submitted to UNESCO for use in their website and for recording of not only our project IGCP673 but also projects 495 and 587, the precursors to 673. This doco was used in public presentations and in the *DinoQuest* exhibition in Singapore and that will continue when *DinoQuest* is again able to travel. Currently this exhibition is in storage in Singapore and plans are underway for the first venue post-Covid-19 will be in Sarawak as the first exhibition in a new museum **to be launched in 2022 or early 2023** (hopefully) in Kuching. **(P. Vickers-Rich, T. H. Rich** and S. Pritchard)
Two further documentaries **are underway in 2021, now extended into 2022-2023** related to **Alfred Russel Wallace**, Darwin's co-proposer of evolution by natural selection. This doco deals with his collecting efforts in Southeast Asia in the 1850's and 1860's and is being developed in concert with Prof John van Wyhe at the National University of Singapore and the Singapore Science Centre where this team developed an inhouse exhibition that ran for 2 years and is now being prepared to travel as a joint operation**. (P. Vickers-Rich & T. H. Rich)**
Another doco is under construction concerning our work on **Polar Dinosaurs Along the Victorian Coast**. Here filming has occurred for the last decade – in cooperation with

Museums Victoria, the Bunurong, Wurundjeri and Eastern Maar People, Parks Victoria and several universities (Swinburne University of Technology, Deakin University and Monash University) as well as local entities (RACV Inverloch Resort, the Otway Lightstation – where regional exhibitions have been developed) and other community groups such as the Bass Coast Council. – Planning, in conjunction with the Bass Coast Council, is underway to develop a Dinosaur Trail that parallels the Rail Trail and the Yallock-Bulluk Marine and Coastal Park Trail. Funding of $230,000 to the Bass Council to further proceed with this project was granted by the State Government in **2020 and this project is ongoing into 2022**. **(T. H. Rich & P. Vickers-Rich)**

PhD/MS Students Being Mentored

Ms Yulia Shuvalova, PhD, the Precambrian biota of northern Siberia (Swinburne University of Technology. **Accepted and submitted in January 2022. PhD granted.**

Ms Farnoosh Farjandi, PhD, the Ediacaran-Cambrian biotic transition in Iran (Swinburne University of Technology). **Submitted in April 2022 and under review.**

Mr Les Kriesfeld, PhD, the Ediacaran-Cambrian biotic transition in Namibia (Monash University). **Due to submit by the end of 2022 or early 2023 (on leave for 1 year at present)**

Ms Adele Pentland, PhD, the pterosaurs of the Cretaceous of Australia (Swinburne University of Technology). **Due to submit in late 2024 and on track**.

Ms Samantha Rigby, MSc, detailed scanning of the skeletons of several sauropod dinosaurs from the Winton region of Australia to assess their taxonomy (Swinburne University of Technology). **Due to submit in late 2022 and on track.**

5 June 2022