The Australian Geologist (TAG) Report for 2004

IGCP 493 THE RISE AND FALL OF THE VENDIAN BIOTA

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IGCP493 continues to investigate those significant events in Earth history during the latter part of the Proterozoic, the Ediacaran. It is closely linked with IGCP478 and has heartily supported the proposed new IGCP project that deals with the glacial events during this period. Of particular importance to this project is understanding the complex web of interactions between climate, ocean chemistry, continental configuration and the biodiversity all of this engendered leading to the "Verdun Event" of Dzik– that time when many life forms acquired armor (skeletons) or started to dig trenches (bioturbation).

Much has been accomplished during the second year of this project, in both the academic and popular arenas.

Year 2. (2004). South America, Namibia, North America, Russia and Australia

Field Workshops and Working Groups

- **During April** a small field workshop was carried out in Argentina hosted by Drs. Guillermo and Florencio Acenolaza (Universidad de Tucuman, Tucuman, Argentina) to assess the possibility of future work on the Puncoviscana Formation. Results of this trip were forward plans to search this formation to the north of Tucuman (where it is less deformed) for Ediacaran faunas as well as determine the palaeoenvironmental setting, earch for datable rocks and samples for carbon isotope signals later in this project. Another short trip was made to a very limited outcrop of Late Neoproterozoic rocks in Rio Negro Province, Argentina.

Conferences and Workshops

- **During April** several papers were presented by IGCP493 participants at two scientific conferences in Russia (St Petersburg and Moscow) celebrating the 90th birthday of B. S. Sokolov, proposer of the Vendian) and at the Origin of Animals Symposium (at UCLA, Los Angeles). In June, several papers were given at the Geoscience Africa meetings in Johannesburg., South Africa. A number of popular lectures were presented by IGCP participants in Namibia, South Africa, Australia and the United States – including and invited keynote lecture at the Geological Society's Annual Selwyn Symposium in Melbourne: "Changes in Metal Availability Through the Precambrian and the Rise of Biological Complexity."

- **During August**, many members of IGCP493 and the Ediacaran Subcommission on the ICS presented papers at the International Geological Congress in Florence A two day workshop was held at the nearby Prato Centre, a campus of Monash University, from 30-31 August. Thirty-one papers were presented, and the whole conference video and audio-taped for future use in a documentary on ideas presented at the conference. An abstract volume resulted and this is now being expanded into an extended abstract volume being considered for publication by the Geological Society of London as a Special Paper volume. The workshop had over 40 attendees representing a variety of fields from palaeontology (both macro and micro), plate-tectonics, geochemistry, geochronology, sedimentology, and molecular biology. The participants ranged from long-time professionals in their fields to students, and the evening discussion sessions allowed those of many different persuasions to amicably interact. Funds from IGCP allowed the subsidizing of participants from India, Russia, Iran and Ireland, and representation at the workshop included participants from Europe, North and South American, Asia, Australia, Africa – essentially all corners of the globe. The IGCP 493 meeting in Prato was combined with the worksop of the Subcomission on the Ediacaran (ICS, IUGS) lead by Jim Gehling, which outlined new strategies and tasks for the future of this group.

Books and Field Guides

- Writing and photography for a highly illustrated popular book on the origin and early evolution of the first animals, emphasizing the Late Neoproterozoic (Ediacaran) assemblages continued. In this book, these first animals are placed within a setting of changing environments, climate and continental arrangements A contract with Johns Hopkins Press was approved, and the Monash University Publications Committee granted sufficient funds to allow this to be a full colour 300 page publication. Final manuscript to be submitted in late 2005.

- One field guide resulted from work in the Flinders Ranges: Gehling, J. G., 2004. *Field guide to the Ediacaran-Cambrian of the Flinders Ranges South Australia*. South Australian Museum, 70 pp.

Exhibitions, Public Lectures and Internet Access

- Development continued on the *Beyond the Edge* exhibition on the origin of animals, emphasizing the Ediacara assemblages of Australia (in conjunction with the South Australian Museum), the Nama assemblages of Namibia (with the Geological Survey of Namibia) and the Vendian assemblages of Russia, Siberia and the Ukraine (with the Paleontological Institute, Moscow). Materials are now secured for this exhibition that will be launched in 2006 at the Fukui Prefectural Dinosaur Museum on Honshu. Proceeds generated by this exhibition will be used for further research and development of educational materials on the Ediacaran faunas in the future and will benefit many institutions. A joint field trip **in January** into the Macdonnell Ranges of the Northern Terriotry with staff of the Northern Territory Museum allowed collection of stromatolites and archaeocyathids as well as other material to be used in the *Beyond the Edge Exhibition*. Photographs made on the Great Barrier Reef while some participants of IGCP493 were carrying out work at the Lizard Island Research Station will be of use in this exhibition an other programs that are part of IGCP493.

- Three scientific exhibitions devoted to the Vendian Biota were mounted by the Russian members of IGCP493 in the cities of Vladimir and St Petersburg (Russia) and Warsaw (Poland).

- Gehling designed the first stage of a new section in the South Australian Museum Origin Energy fossil Gallery: "Origin of Animals – Ediacaran-Cambrian fossils of South Australia,

opened this year. This gallery enables observers a close up and tactile experience with the more subtle Ediacara fossil impressions from the Flinders Ranges.

- Several public lectures and keynote addresses as well as media interviews were presented by members of IGCP493, examples being Jim Gehling's *The End of Snowball Earth and the Entry of Animals: the Ediacaran Period* to the Geological Society of Australia, South Australian Branch Annual General Meeting in April and in March *Origin of Animals: A Window to the Flinders Ranges* to the Waterhouse Club, a public group that fundamentally supports work on the Ediacaran biota.

- In July Gehling conducted tours of key Ediacaran sites in the Flinders Ranges, South Australia for graduate students and professors from both Australian and overseas universities and members of the Waterhouse Club in the Flinders Ranges. The Waterhouse Club members aided in a GPS logging survey of fossils on the Ediacara Reserve.

- The 2003 Annual Selwyn Lecture of the Geological Society of Australia, Victorian Division, was present by Patricia Vickers Rich, jointly with Mikhail Fedonkin: *The Cold Cradle of Animal Life: coldwater Basins, Squestered Metals and Plate Dynamics – Drivers of Biological Complexity.*

- Late in 2003 members of IGCP493 provided the content and illustrations for a special large format poster that was published by ***The Age*** newspaper in Melbourne, a poster tied to the National Curriculum and Standards for pre-Tertiary students.

- An internet site has been set up for IGCP493 (http://www.earth.monash.edu.au/PreCSite/index.html) and Russian participants in IGCP493 have a special site devoted to the Vendian biota and related topics near completion (in Russian with a bilingual segment planned for the future).

Field Worshops and Exploration

- **During June** members of IGCP493 held a field workshop and prospected the Nama Group in southern Namibia with members (including two students) of the Geological Survey of Namibia, resulting in the discovery of several new localities at a number of stratigraphic levels within the Kliphoek Member of the Dabis Formation. Stratigraphy and paleotological specimens are currently being described by M. Fedonkin, A. Ivantsov, P. Vickers-Rich, K.H. Hoffmann, G. Schneider and students working with the Survey. One student from Namibia has applied for Ph.D. work at Monash University and one other may apply in the near future. Sampling for datable ashes (2 possibly datable levels) and carbon isotope content was carried out and samples are currently being studied by members of the IGCP493 group.

- Investigation of the possibility of opening up a Cambrian Burgess Shale-like faunal quarry on Kangaroo Island, South Australia in cooperation between the South Australian Museum and the School of Geosciences, Monash University took place. This will be both a source of research and provide material for the Beyond the Edge Exhibition illustrating the Early Cambrian/post-Ediacaran radiation of metazoans. Jim Gehling assessed this site, and plans are currently being made for a future excavation.

- Two expeditions to Vendian sites in the White Sea Region and Middle Urals were carried out. In addition to the megascopic fossils, representative assemblages of the oldest Vendian (Ediacaran) microfossils have been reported from the northeastern part of the Russian Platform and the SW Siberian Platform.

Student Projects, Short Courses, University Courses, Public Education

- An undergraduate course dealing with Precambrian biostratigraphy, global events, palaeoecology and the development of complex life, which can be used as a shortcourse, emphasizing the events and biota of the Ediacaran time period was under construction – parts of it being delivered in 2004 as a part of 2nd and 3rd year palaeontology in the School of Geosciences, Monash University, Melbourne.

- A number of student projects involving Australian, Russian and Namibian graduate students were initiated. Students included two Namibians, their projects on the detailed stratigraphy of the Kliphoek Member of the Dabis Formation,to one Australian working on the acritarch biostratigraphy of core samples from the Neoproterozoic of the Northern Territory and another on stromatolite structural analysis. In Russia one student carried out taphonomic investigations of *Beltanelloides* and *Nemiana.* More student projects are under discussion with the main purpose to insure a younger generation of Ediacaran specialists for the future.

- One PhD thesis (*Taphonomic and Ecological Peculiarities of the White Sea Biota of the Vendian*) was successfully defended by D. V. Grazhdankin in November (Moscow State University).

- The project with **Australia Post** to produce and launch a series of stamps on the Ediacarans *Spriggina*, *Charniodiscus, Tribrachidium, Dickinsonia, Inaria* at the International Stamp Expo in Sydney 2005 is well underway. Multia-award-winning reconstruction artist (Cover of **Time Magazine** 1993) Peter Trusler is rendering the reconstructions and fossil art under the direction of Gehling, Fedonkin and Vickers-Rich. The Monash Science Centre, in conjunction with the South Australian Museum, is preparing silver jewelry, 3 dimensional models, art work and education guides that will accompany this issue.

- Under the direction of Jim Gehling and with the support of Origin Energy, the new Precambrian Gallery at the South Australian Museum was opened. More construction on this gallery is underway, but it will stand as the only permanent exhibition of the Flinders Ranges Ediacaran materials.

Research Grants

- An ARC discovery grant (2004-2007) was awarded to Jim Gehling, Mary Droser and Soren Jensen for a project entitled "Overturning the Ediacara biota: community structure of the oldest animal ecosystems." They are excavating and analyzing the Ediacara fossil record on successive Ediacaran bedding surfaces from a site in the western Flinders Ranges.

- A successful ARC grant ($50,000) for *Australia at the Forefront of Science: Australian Contributions to "Big Science*" granted to P. Vickers-Rich and Sue Turner, allowed research on the history of IGCP and the involvement of Australians as well as the history of work on the Ediacaran biota by Sprigg, Glaessner, Wade, and Jenkins, amongst others in bringing the Ediacarnas to the world. Preliminary results of this research were presented at the IGC and the IGCP Workshop in Prato.

- In addition to the support provided by the Ineternational Geological Correlation Program and ARC, further funds were forthcoming from the National Geographic Society, Monash University, the Russian Fund for Basic Reseaarch, the Russian Fund Governmental and the Russian Academy of Science, as well as funds from private donars.

Research Programmes

- **In April and early May** visits of IGCP participants to the Smithsonian Institution to confer with E. Yochelson on 1.4 million year old metazoan remains from North America and Australia, to the National Geographic Society, attendance at Bill Schopf's UCLA symposium on Early Animals (April) occurred. A result of the Smithsonian visit was the completion of two papers on *Horodyskia* by Fedonkin and Yochelson and continued work on *Grypania.*

- Description of material from Namibia and detailed discussion between Russian and Australian collegues and artist Peter Trusler at the Paleontological Institute in Moscow during September will also lead to significant new interpretations and reconstructions of Ediacaran metazoans.

Collections

- Curation of Nama Group fossil collection in the Namibian Geologyical Survey (Windhoek) was carried out and the collection was doubled in size based on the field work in 2004 of IGCP493. Funds were raised for the purchase of 25 cabinets and space was allocated for housing the entire Vendian and Tommotian fossil collection in the Paleontological Institute (Moscow) and the collection will be curated and moved into this new space during early 2005. Curation and digital documentation of the South Australian Museum collections of Ediacaran material continues.

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