2003 Meetings, Field Excursions, and Activities Report Form
Re: UNESCO-IUGS/IGCP
Project Number and Title: IGCP493, The Rise and Fall of the Vendian Biota

1. FIELD EXCURSIONS

Date: 4 June-12 July 2003.
Place: White Sea, northern Russia
Itinerary: Moscow-Archangelsk-Souz'ma (Summer Coast) to Zimnegorsky Region of Winter Coast-Moscow

SCOPE AND RESULTS OF MEETING:

1.1 Scope of Meeting (program or outline of geological study)

The aims of IGCP 493 activities during this field conference were:

(1) To continue to examine in detail the White Sea sediments producing one of the four important Vendian metatzoan biotas and allow in depth discussions in the field of the mode of accumulation, the palaeoenvironmental setting and dating of this sequence in order to compare its setting with regard to faunas from Australia, North America and Namibia.
(2) To finalize a field guide to sites in this type area of the Vendian.
(3) To visit known sites and attempt to collect more complete material in place, for the sake of better dating and secondly a better understanding of the taphonomy and palaeogeograpic relations with other known Vendian faunas, using the diverse backgrounds of the participants in the hope that new discoveries would be made.
(4) To finalize selection of a number of possible student projects to be supervised by many of those involved in IGCP493 and encourage the development of joint projects between the participants from a number of countries represented.
(5) To finalize the photography of field sites and specimens with the intent to use both in scientific and popular publications, again under joint authorship, and to develop concepts to be used both in these publications and in a planned major traveling exhibition .

1.2 Achievements and Outcome of Meeting

The field group on the White Sea had diverse backgrounds: palaeontology (both marco and micro, both invertebrate and invertebrate), sedimentology, stratigraphy (both physical and biological), reconstruction art, science education and public communication, amongst others. Thus, all of the aims were achieved and more.

(1) Detailed lithofacies maps were constructed by Andrew Constantine of several productive sites in the Winter Coast sequence. An open file report is under preparation by Constantine with a plan to submit a paper on the results in 2004.

(2) A preliminary field guide to the Summer and Winter Coasts is under preparation. based on the information already available and gathered on this trip.

(3) An important discovery at Souz'ma was the location of the level which has for more than 20 years produced an abundance of Vendian metazoans. Until this field excursion some key taxa, such as *Albumares*, *Onega*, *Vendomia* and *Dickinsonia*, appeared as float in blocks along the Souz'ma River's edge. Ivantsov and Grazdankin located the very layer from which these fossils were derived, and a second trip later in

the summer led by Andre Ivantsov allowed detailed collection from this layer. A third specimen of the rare genus *Ausia* (known only from 2 other specimens – one from Russia and a second from Namibia) was recovered from Souz'ma. Thus, with "new" eyes and luck, the data base was significantly expanded.

(4) A number of student projects were determined and in 2004 at least one, possibly two such projects will begin. More are planned for the future with cooperation between Monash University and the Paleontological Institute, Russian Academy of Science (RAS), providing facilities and some funding.

(5) Collections in the Paleontological Institute, RAS (Moscow) were photographed in detail as were the field sites at Souz'ma (Summer Coast) and along the Zimnegorsky Coast (Winter Coast), from just north of Mys Kerets to just south of Mys Ostryy. More than 100 rolls of film as well as more than 500 digital images were taken by Constantine, Fedonkin, Hunt and Vickers-Rich, and these form the basis for a large format, full colour popular book and the graphic material for the planned international exhibition. Certainly some of these images will be used in scientific papers – but most will be catalogued and available.

(6) Outcomes of this field workshop have been presented at three major teachers' conferences, which allows the results of cutting edge research to be transmitted into schools (Primary and Secondary) in Australia (Catholic Education Conference, Melbourne August 2003; Bright Minds Conference, University of Queensland, October 2003; 50th Science Teachers Association of New South Wales State Conference, Dec. 2003). As a result of the field excursion, links were developed with the Archangels'k Museum for exchange of material and programmes with the Monash Science Centre (Melbourne) as well as with the Paleontological Institute (Moscow) in the area of public outreach to schools and the general public – centred around the results of research on the Vendian biota.

(7) Plans for a Workshop in Japan in late 2005 or early 2006 resulted from the interaction of the participants on this excursion – emphasizing both the research outcomes and well as public outreach with cutting edge science results headed up by Drs Ohno and Vickers-Rich.

Country	Institutions	Number of participants
AUSTRALIA	Monash University	2
AUSTRALIA	Museum Victoria	1
AUSTRALIA	Origin Energy	1
JAPAN	Kyoto University Museum	1
JAPAN	Nagoya Univeristy	1
JAPAN	Gifu University	1
RUSSIA	Geology and Geophysics, Siberian Branch, RAS, Novosibirsk	1
RUSSIA	Paleontological Institute, R.A.S.	7
UNITED KINGDOM	Cambridge University	1
UNITED STATES	Ronald Chisholm International	1

Field Workshop. Fifteen participants from five countries attended field work in the White Sea, Winter and Summer Coasts Region.

LIST OF PARTICIPANTS - IGCP 478 FIRST FIELD WORKSHOP

Country	Name	Institution
AUSTRALIA	Prof. Patricia Vickers-Rich	Monash University
	Mr Peter Trusler	Monash University

	Dr Andrew Constantine Dr Thomas H. Rich	Origin Energy Museum Victoria
JAPAN	Dr T. Ohno Dr S. I. Kawakami Dr B. Tojo	Kyoto University Museum Gifu University Nagoya University
RUSSIA	Dr Mikhail Fedonkin Dr A. Ivantsov Ms Yana Malakhovskaya Ms Yula Shuvalova Mr Maxim Leonov Dr A. Kochedykov Representative	Paleontological Institute, RAS Geology and Geophysics, Siberian Branch, RAS, Novosibirsk
UNITED KINGDOM	Mr Dimitri Grazdankin	Cambridge University
UNITED STATES	Mr Nathan Hunt	Ronald Chisholm International

2. FIELD PLANNING MEETING:

Date: 21 September-29 September 2003
Place: Flinders Ranges, South Australia
Itinerary: Melbourne-Adelaide-Flinders Ranges (South Australia)-Melbourne (or Adelaide)

SCOPE AND RESULTS OF MEETING:

2.1 Scope of Meeting (program or outline of geological study). The purpose of this small meeting was to:

(1) Assess sites for a later international workshop (to be held in Year 3 of IGCP493) and to photograph and document locales for popular book project and planned exhibition, both the traveling exhibition for 2005 as well as for the opening of a permanent exhibition in the South Australian Museum in 2004.

(2) Prepare a field guide for the Flinders Ediacaran locales which also discussed issues of geochronology, palaeoenvironment, taphonomy, major events (the Acaman event, major glacials), which can be used for the 2005 workshop.

(3) Liase with local pastoralists and caretakers about possiblility of setting up interpretive center and field research station in the Flinders Ranges that would allow public outreach for the research being carried out on the Proterozoic in the region. Meet with the South Australian Premier and his group on site in the Ediacara hills to highlight the importance of the Neoproterozoic site in the Flinders Range, both as a geological treasure but also as an ecotourist attraction that should be used with care and wisdom to enlighten people of the Earth's past.

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2.2 Achievements of Meeting

This small meeting was not funded by IGCP funds, but funds from Monash University. It was meant to be a small, intense consultational meeting to plan for the IGCP493 excursion here in 2005 and to provide photographic coverage of the sites, people and fossils from this important late Proterozoic area from which the Ediacaran biota has been collected over the years. Francesco Coffa, an internationally recognized photographer, was part of this group for this purpose. The following was achieved:

(1) Extensive photographic coverage of field sites producing the Ediacaran biota.

(2) Field guide to the Flinders Ranges completed: J. G. Gehling, 2003. Field Trip Guide Book. Terminal Proterozoic-Cambrian of the Flinders Ranges, South Australia. South Australian Museum and Monash Science Centre, Adelaide and Melbourne, 61 pp.

(3) Material (e.g. rhythmites, Acaman impact layer, etc.) secured for use in international exhibition to premier in late 2005-early 2006.

(4) Detailed discussions concerning the Ediacaran metazoans and their palaeoecologic, palaeobiogeographic, temporal nature held in preparation for IGCP493 field workshop to be held here in 2005.

Country	Institutions	Number of participants
AUSTRALIA	Monash University	2
AUSTRALIA	South Australian Musuem	1
RUSSIA	Paleontological Institute, RAS	1

LIST OF PARTICIPANTS - IGCP 478 FIRST FIELD WORKSHOP

Country	Name	Institution
AUSTRALIA	Prof. Patricia Vickers-Rich Mr Francesco Coffa Dr Jim Gehling Ms Mena Salvatore	Monash University South Australian Museum Melbourne, Ecotourist
RUSSIA	Mikhail Fedonkin	Paleontological Institute, RAS

3- PUBLICATIONS

3.1 Publications in International Journals

Alchin, D., Frimmel, H.E., Jacobs, L., 2003 (in press). Stratigraphic setting of the metalliferous Rosh Pinah Formation and the Spitzkop and Koivib Suites in the Pan-African Gariep Belt, southwestern Namibia. *South African Journal of Geology.*

Buatois, L.A. & Mángano, M.G. 2003. La icnofauna de la Formación Puncoviscana en el noroeste argentino: Implicancias en la colonización de fondos oceánicos y reconstrucción de paleoambientes y paleoecosistemas de la transición precámbrica-cámbrica. *Ameghiniana* 40: 103-117.

Buatois, L.A. & Mángano, M.G. 2003 (in press). Early colonization of the deep sea: Ichnologic evidence of deep-marine benthic ecology from the Early Cambrian of northwest Argentina. *Palaios* 18: 572-581.

Buick, I.S., Williams, I.S., Gibson, R.L., Cartwright, I. (15%), Miller, J.A., 2003. Carbon and U–Pb evidence for a Palaeoproterozoic crustal component in the Central Zone of the Limpopo Belt, South Africa. *Journal of the Geological Society, London*, 160: 601-612.

Fedonkin M.A., 2003. Deterioration of the geochemical basis of life and eukaryotization of biosphere. *Paleontologicheskii Zhurnal* (special volume): 18 pp.

Fedonkin M.A., 2003. The origin of the Metazoa in the light of the Proterozoic

fossil record. *Paleontological Research*, 2003 (special volume): 90 pp.

Fedonkin M.A., 2003 (in press). Biodiversity and Biosphere in the Archeozoic Era through the Camb Period. UNESCO International School of Science for Peace Autumn School on "Global Climate Changes and Impact on Biosphere" October 2-13, 2000, Milan.

Fedonkin M. A., 2003 (In press). Early evolution of biosphere. *Nauka*, Moscow, 22 pp. (In Russian).

Frimmel, H.E., 2003 (in press). Formation of a late Mesoproterozoic supercontinent: The South Africa-East Antarctica connection. *In:* Eriksson, , P.G., Altermann, W., Nelson, D.R., Mueller, W.U., Catuneanu (es.). *The Precambrian Earth: Tempos and Events*, Elsevier, Amsterdam.

Frimmel, E.H., Lane, K., 2003 (in press). Geochemistry of carbonate beds in the Neoproterozoic Rosh Pinah Formation, Namibia: Implications on depositional setting and hydrothermal ore formation. *South African Journal of Geology*.

Frimmel, H.H., 2003 (in press). Late Vendian closure of the Adamastor Ocean: Timing of tectonic inversion and syn-orogenic sedimentation in the Gariep Basin. *Gondwana Research.*

Frimmel, H.E., 2003 (in press). Neoproterozoic sedimentation rates and timing of glaciations – a southern African perspective. In: Eriksson, P.G., Altermann, W., Nelson, D.R., Mueller, W.U., Catuneanu (es.). *The Precambrian Earth: Tempos and Events*, Elsevier, Amsterdam.

Gaucher, C., Boggiani, P. C., Sprechmann, P., Sial, A.N. and Fairchild, T., 2003. Integrated correlation of the Vendian to Cambrian Arroyo del Soldado and Corumba Groups (Uruguay and Brazil): palaeogeographic, palaeoclimatic and palaeobiologic implications. *Precambrian Research* 120: 241-278.

Grey, K., Walter, M. R. and Calver, C R., 2003, Neoproterozoic biotic diversification: Snowball Earth or aftermath of the Acraman impact? *Geology*, v. 31, p. 459–462, Data Repository item 2003061.

Grey K., E.L.Yochelson, Fedonkin, M.A. and McB.Martin, D., 2004 (in advanced preparation). Horodyskia williamsii new species, a Mesoproterozoic megafossils from Western Australia. *Alcheringa.*

Hengeveld R. and Fedonkin M.A. 2003. Life's origin and unfolding popularized - De Duve, C., 2002. Life evolving. Molecules, mind and meaning. *Acta Biotheoretica*, 51 (3): 239-244.

Hengeveld, R. and Fedonkin, M. A., 2003 (in press). Causes and consequences of eukaryotization through mutualistic endosymbiosis. *Acta Biotheoretica*. (72 typewritten pages).

Hocking, R. M., (compiler) with contributions from Ghori, K. A. R., Pirajno, F., and Stevens, M. K., Grey, K., Carlsen 2003, Drillhole WMC NJD 1, western Officer Basin, Western Australia: stratigraphy and petroleum geology, *Geological Survey of Western Australia, Record* 2002/18, 26 pp.

Ivantsov A.Yu., 2003. The Vendian organism is being recognized by its imprint. *Priroda*, 10: 3-9 (in Russian).

Ivantsov A.Yu., 2003 (in press). New Proarticulata from the Vendian deposits of Arkhangelsk District. *Paleontologicheskii Zhurnal.* (In Russian and English).

Ivantsov A.Yu. and Fedonkin, M.A, 2003. Conulariid-like fossil in the Vendian (Russia): a metazoan

clade crossing the Proterozoic-Paleozoic boundary. *Palaeontology*, 19 pp.

Ivantsov A.Yu. and Fedonkin M.A. 2003 (in press). Reinterpretation of the Vendian *Ventogyrus* as a trilobozoan coelenterate, Onega River, north of the Russian Platform. *Journal of Paleontology*. (39 typewritten pages).

Ivantsov A.Yu. and Malakhovskaya Y.E. 2003 (in press). Giant trails of the Vendian animals. *Doklady Rossiiskoi Akademii Nauk*. (In Russian and English).

Ivantsov A.Yu., Malakhovskaya Y.E., Serezhnikova E.A., 2003 (in press). Some problematics from the Vendian deposits of the south-eastern White Sea. *Paleontologicheskii Zhurnal*. (In Russian and English).

Jensen, S., Droser, M.L. and Gehling, J.G. 2003 (in press). Trace fossil preservation and the early evolution of animals. *Palaeogeography, Palaeoclimatology, Palaeoecology*

Johnson, T.E., Gibson, R.L., Brown, M., Buick, I.S., & Cartwright, I. (10%), 2003. Partial melting of metapelitic rocks beneath the Bushveld Complex, South Africa. *Journal of Petrology*, 44: 789-813.

Kozlov V. I. and Fedonkin M. A. Professor B. M. Keller. *Encyclopedia of the Ural Geology*, Ufa, 6 pp. (In Russian).

Maheshwari, A., Sial, A.N. and Mathur, S.C., 2003. Carbon isotope oscillations through the neoproterozoid-Lower Cambrian Marwar basin, Western Rajasthan, India. *Carbonates and Evaporites*, 18 (1).

Maheshwari, A. and Sial, A.N., 2003 (in press). C-isotope composition of Delhi Supergroup, India: Implications for Mesoproterozoic oceanic C isotope evolution. *Palaeogeography, Palaeoclimatology, Palaeoecology*.

Meheshwari, A. and Sial, A.N., 2003 (in press). C-isotope composition of carbonates from Aravalli Mountain Range, India. Review of Late Palaeoproterozoic to Mesoproterozoic oceanic C-isotope evolution. *Gondwana Reseach*.

Maheshwari, A., Sial, A.N., Mathur, S.C. and Tripathi, R.P., 2003. ^{13}C variations in Late Jurassic carbonates, Jaisalmer Formation, Western India. *Gondwana Research*, 6 (4): 931-934.

Narbonne, G.M., and Gehling, J.G., 2003. Life after Snowball: the oldest complex Ediacaran fossils. *Geology*, 31: 27-30.

Raith, J.G., Cornell, D.H., Frimmel,H.E., de Beer, C.H., 2003. New insights into the geology of the M Tectonic Province, South Africa, from ion microprobe dating of detrital and metamorphic zircon. *of Geology*, 111: 347-366.

Schaefer, B.F. and Burgess, J.M. 2003 Re-Os isotopic constraints on deposition in the Neoproterozoic Amadeus Basin: Implications for the “Snowball Earth”. *Journal of the Geological Society of London*, 160: 825-828.

Turner, S. 2003 (in press). Early vertebrates: analysis from actual fossil evidence For Prof. Dr Hans-Peter Schultze *65th Birthday Festschrift*. F Pfeil Verlag, Munich.

Turner, S. 2003 (in press). Stages in the origin of vertebrates: analysis from actual fossil evidence. For Prof. Dr Hans-Peter Schultze *65th Birthday Festschrift*. F Pfeil Verlag, Munich.

Turner, S., Blieck, A. R.M. & Nowland, G.S. 2003 (in press). Cambrian-Ordovician vertebrates. *In*: Droser, M., Webby BD & Feist R. eds *IGCP410 The Great Ordovician Biodiversity Event*,, Columbia University Press.

Vickers-Rich, P., 2003. Bugs in the soup; bacterial action and the formation of major ore deposits. *2nd SGEG-MORE Mini-Symposium,* 8 April, Monash University, Melbourne: Notes: 13-14.

Wood, D.A., Dalrymple, R.W., Narbonne, G.M., Gehling, J.G. and Clapham, M.E. 2003. Paleoenvironmental analysis of the late Neoproterozoic Mistaken Point and Trepassey formations, southeastern Newfoundland. *Canadian Journal of Earth Sciences* 40: 1375-1391.

3.2 Short Papers / Extended Abstracts/Abstracts in Conference Proceedings

Bisnath, A., Frimmel, H.E., Armstrong, R. ,2003. Structural geology and geochronology of the Gjelsvikfjella area, northern Maud Belt, East Antarctica. In: Fütterer, D. (ed.), *Antarctic Contributions to Global Earth Science*, *9 th International Symposium on Antarctic Earth Science*, 8-12 Sept 2003, Potsdam: 29-30.

Brain, C.K., Prave, A.R., Fallick, A.E. and Hoffmann, K.-H., 2003. Sponge-like microfossils from Neoproterozoic intertillite limestones of the Otavi Group in northern Namibia. *In*: Frimmel, H.E. (Ed.), III *International Colloquium Vendian-Cambrian of W-Gondwana, Programme and Extended Abstracts*, Cape Town:19-23.

Droser, M.L., Gehling, J.G., and Jensen, S. 2003. Voyage to the bottom of the Ediacaran sea: what's missing from the picture*? Geological Society of America Abstracts with Program* : 40-8.

Fedonkin, M.A., 2003. Metazoans of the Vendian Period in the aspects of palaeoecology and palaeogeography: White Sea, Russia. *In*: Frimmel, H.E. (Ed.), *III International Colloquium Vendian-Cambrian of W-Gondwana, Programme and Extended Abstracts*, Cape Town: 25-26.

Frimmel, H.E., 2003. Mesoproterozoic continental growth: The South African-East Antarctic connection. In: Futterer, D. (ed.). Antarctic *Contributions to Global Earth Science, 9th International Symposium on Antarctic Earth Science*, 8-12 Sept, Potsdam: 109-110.

Frimmel, EH.E. and Jonasson, I., 2003. The controls on Neoproterozoic base metal mineralizatin. In: Eliopoulos, D.G, et al. (eds.). *Mineral Exploration and Sustainable Development.* 7th Biennial SGA Meeting, Athens, 24-28 August 2003, Millpress, Rotterdam, 2: 661-664.

Gaucher, C. and Germs, G.J.B., 2003. Acritarch biostratigraphy and correlations of the late Vendian Cango Caves Group, Saldania Belt (South Africa). *In*: Frimmel, H.E. (Ed.), *III International Colloquium Vendian-Cambrian of W-Gondwana, Programme and Extended Abstracts*, Cape Town: 29 - 32.

Gehling, J.G. 2003. Evidence and absence of Ediacaran style fossil assemblages in the Proterozoic. *Geological Society of America Abstracts with Program:* 156-9.

Gehling, J.G., Droser, M.L., and Jensen, S. 2003. Ediacaran fossil myths. *Geological Society of America Abstracts with Program*: 204-2.

Grey, K., Hill, A. C., Walter, M. R., and Calver, C. R., 2003 (abstract and talk by ACH), Biotic diversification and isotope changes at the ~580 Ma (late Neoproterozoic) Acraman

Impact Event: 'Biological processes associated with impact events', *10th European Science Foundation-IMPACT Workshop*, Kings College, University of Cambridge, UK, March 29-April 1, 2003: 27.

Grey, K., Hill, A.C., Walter, M.R., and Calver, C.R., 2003 (abstract and talk). Neoproterozoic biotic diversification: 'Snowball Earth' or aftermath of the Acraman Impact: Geological Society of Australia, WA Division, *West Australian Geologist,* 473, May 2003: 3. May Monthly Meeting.

Grey, K., Hill, A.C., Walter, M.R., and Calver, C.R., 2003 (abstract and talk by MRW), Abstract # 12896 (oral presentation) Plankton and isotope changes at the late Neoproterozoic Acraman impact ejecta layer: *NASA Astrobiology Institute General Meeting,* 2003, February 10-12, Arizona State University, Tempe, Arizona: 222.

Maheshwari A, Sial, A.N., Ferreira, V.P. and Romano, A.W. , 2003. Lomagundi phenomenon in Paleoproterozoic carbonates of Brazil and India. *Fourth South American Symposium on Isotope Geology (IV SSAGI)*, Salvador, Bahia, Brazil

Maheshwari, A., Sial, A.N. and Mathur, S.C. (2003) Carbon isotope fluctuations through the Neoproterozoic-Lower Cambrian (?) carbonates, Rajasthan, India. *The 12th Bathurst Meeting, Durham: International Conference of carbonate sedimentologists.*

Narbonne, G.M., Gehling, J.G. and Clapham, M.E. 2003. Life after snowball: the Mistaken Point biota and the origin of animal ecosystems*. Geological Society of America Abstracts with Program*: 210-3.

Wilde, A.R., Edwards, A., Yakubchuk, A., 2003 (in press). Unconventional Deposits of Pt & Pd: A Review with Implications for Exploration*: SEG Newsletter*.

Zimmermann, V.U. and Germs, G.J.B., 2003. Black Sands as traces of provenance: A heavy mineral case study of the early Paleozoic Haribes Member (Nababis Formation, Fish River Subgroup) of the Nama Group in Namibia- first results. *In*: Frimmel, H.E. (Ed.), *III International Colloquium Vendian-Cambrian of W-Gondwana, Programme and Extended Abstracts,* Cape Town: 45 – 47.

3.3 Public Lectures, Informal Talks, Teachers' Conferences, Web Addresses, Etc.

Fedonkin, M.A., 2003. February 19, 2003. 2-hour lecture "Origin of life and an early biosphere" at the Geology Department, Kyoto University, Japan.

Fedonkin, M.A., 2003. February 20, 2003. 2-hour lecture "Rise of the biological complexity as an evolutionary response to the geochemical impoverishment of biosphere in and Proterozoic" at the Geology Department, Kyoto University, Japan.

Fedonkin, M.A., 2003. February 21, 2003. 2-hour lecture "Eukaryotization of the global ecosystem. Origin and early evolution of Metazoa. Snowball Earth and problem of the Precambrian oil resources "at the Geology Department, Kyoto University, Japan.

Fedonkin M.A. Biodiversity and Biosphere in the Archeozoic Era through the Cambrian Period. Lectures at the UNESCO International School of Science for Peace. Autumn School on "Globa Climate Changes and Impact on Biosphere" October 2-13, 2000, Milan. (WWW site of the Dept. of Environmental Science, Università degli Studi di Milano Bicocca, Italy) (WWW site of the Paleontological Institute, Russian Academy of Sciences: http://www.paleo.ru/paleonet/library.html?show=9

Fedonkin M.A. Cold Cradle of Animal Life. (WWW site of the Paleontological Institute, Russian Academy of Sciences: http://www.paleo.ru/paleonet/library.html?show=3

Fedonkin M.A. Geochemical impoverishment of the biosphere and rise of complex life. (WWW site of the Monash University, Victoria, Australia: http://www.sci.monash.edu/news/articles/pdf/Abs_Fedonkin.pdf

Fedonkin, M.A. and Gehling, J., 2003. "The Precambrian Fauna of Russia, Australia and Namibia Revisited. " Science Teachers Association of New South Wales, 50th Annual State Conference, Macquaire University, Sydney, December, 2003, Workshop, *STANSW Conference Booklet*: 31.

Gehling, J.G. 2003. "Fossils from a frozen ocean". *South Australian Public Lecture Series,* September 17.

Gehling, J.G. 2003. "Ediacaran Period: Life after Snowball". *South Australian Geology Teachers Association*, SSABSA Workshop, November 28.

Grey, K., 2003 (talk), "Was it life as we know it"….*AstroFest* 2003, February 8th, Trinity College, Perth.

Grey, K., 2003 (talk), "Acritarchs, impacts, and the Snowball Earth*". Gemmological Society*, WA Division.

Grey, K., (talk) "Aftermath of an asteroid impact." *Mars Society of Australia*, WA Branch, Trinity College.

Grey, K., 2003, (talk) "The Dawn of Life Trail": public talk presented at Marble Bar Civic Centre.

Vickers-Rich, P., 2003. "A passion for juggling. A journey in the present and the past. " Keynote Address, *Catholic Education Office Conference: Communicating? Comfortable? Compromising?* Parkville, Melbourne, August, 2003.

Vickers-Rich, P., 2003. Russian helicopters and wild and dusty places of the World: A lady geologist in remote field work. Keynote Address, *Enriching the Future, Science Educatiion in the Middle Years Conference*, Bright Minds, Unversity of Queensland, School of Education, Brisbane, October 2003.

Vickers-Rich, P., Fedonkin, M.A. and Gehling, J., 2003 (Abs. and Talk). " Beginning of Animal Life on Earth" Keynote Address and Discussion Group. *Science Teachers Association of New South Wales, 50th Annual State Conference*, Macquaire University, Sydney, December, 2003, *STANSW Conference Booklet*: 7, 11.

Vickers-Rich, P., Fedonkin, M.A. and Gehling, J., 2003 (Abs. and Talk). "The Precambrian Fauna of Russia, Australia and Namibia." *Science Teachers Association of New South Wales, 50th Annual State Conference*, Macquaire University, Sydney, December, 2003, Workshop, *STANSW Conference Booklet*: 17.

3.4 Field Trip Guide

Frimmel, H E, Germs, G J B, 2003. The geology of the external Gariep Belt and Nama Basin. South Africa/Namibia. - *IGCP478 Field Workshop, 25-31 October 2003,* University of Cape Town, Cape Town, 55 pp.

J. G. Gehling, 2003. Field Trip Guide Book. Terminal Proterozoic-Cambrian of the Flinders Ranges, South Australia. *South Australian Museum and Monash Science Centre*, Adelaide and Melbourne: 61 pp.

4- OTHER ACTIVITIES/SOURCES OF SUPPORT

Besides the two field workshops, publications and lectures, IGCP493 had a number of other activities and achievements:

(1) Attraction of Further Funding to Support IGCP493 Programmes:

a. ARC Discovery Projects Grant (2004) to Prof. Patricia Vickers-Rich and Dr Susan Turner to document history of research on Precambrian Metazoans, UNESCO-IGCP Programme. Title: Australia in the Forefront of Science: Australian Contributions to "Big Science."
$50,000.00 (Aust.).

b. Small ARC grant to P. Vickers-Rich for research on the Vendian/Ediacaran metazoan faunas of Russia, Australia and Namibia.
$9786.00 (Aust.)

c. Research Initiatives Grant, Monash University for work on late Proterozoic biota and palaeoenvironments
$9398.00 (Aust.)

d. Travel Grant, Monash University for work on White Sea, Russia To Vickers-Rich
$1,750.00 (Aust.)

e. Monash Science Centre grant to fund visit of Prof. Mikhail Fedonkin for cooperative work at Monash University, Sept.-January, 2003-2004
$8500.00 (Aust.) of

f. Private donar support for work on White Sea, Russia, Workshop
$4000.00 (US)

g. Australian UNESCO Committee (for IGCP) **$6000.00 (Aust.)**

h. National Geographic Grant (to M. Fedonkin) **$10,480.00 (US)**

i. Other sources (to M. Fedonkin) **$22,206.00 (US)**

j. ARC Discovery Projects Grant (2004) to Dr, J.G. Gehling, Dr. M.L. Droser, and Dr S. Jensen. Title: Overturning the Ediacara biota: community structure of the oldest animal ecosystems. **$50,000.00 (Aust)**

(2) Curation of Fundamental Collections of Vendian/Ediacaran Metazoans.

Two collections, that in the South Australian Museum in Adelaide, and the other in the Geological Survey of Namibia in Windhoek (Fedonkin and Vickers-Rich), have been curated. In the case of the Adelaide collection it has been housed in Due to cooperative work headed up by Jim Gehling and Richard Jenkins, the University of Adelaide collections have been amalgamated with the South Australian Museum Collections in the SAM. These collections serve as the basis for a major new permanent exhibition that will open next year at the SAM, under the curatorship of Gehling. It is the intention of the IGCP working group to continue this curation and to

make available on data base photographs of as many of the Vendian/Ediacaran metazoan taxa as possible.

(3) Organization of Exhibition, of Substantial Size, on the Archean and Proterozoic, Emphasizing the Rise of Metazoans.

In 2003 agreements have been made with several museums holding key material to provide specimens for this exhibition and text for panels in the exhibition, and design for the support material is underway. Fundraising and venue selection is also underway, with a tentative premier venue to be in Japan in 2005-2006. Specimens, including a 2.5 ton piece of Banded Iron Formation from the Tom Price Mine, have been donated to the Monash Science Centre collections. The Monash Science Centre in concert with the South Australian Museum and the Paleontological Institute (Moscow) and the Archangelsk Museum (White Sea Region of northern Russia) is developing a substantial series of education modules to accompany the exhibition, and these materials will be translated into Russian and Japanese, with other languages possible in the future – for use in Primary and Secondary Schools around the world.

Accompanying the exhibition will be some commercial products – already silver jewelry has been designed and produced, accompanied by an information brochure, for some of the Vendian/Ediacaran metazoans (*Parvancorina*, *Tribrachidium* and *Dickinsonia*). Funds generated from this will be used to support research and educational activities associated with this project.

To be part of the exhibition, a documentary concerning the collection, study and interpretation of the Vendian/Ediacaran biota is underway. Part of this was filmed in Namibia in cooperation with IGCP478 (see report for this project) by a TV crew from America del Sur and TVEOChannel (principals were Mr Horacio Portal and Mr Silvestre Triunfo from Uruguay). Further discussions are underway with the National Geographic Channel in Australia.

(4)Joint Meetings with IGCP 478

A most successful cooperative meeting with IGCP478 was held in South Africa and Namibia and Fedonkin, Gehling and Vickers-Rich are serving in various capacities within that project. Strong linkage between these two projects will continue for the life of both.

Particularly important for some members of the IGCP493 attending the meeting in southern Africa organized by IGCP478 was the linkage made between members of both groups and the linkage of our group with the Geological Survey of Namibia, especially with Drs Gabi Schneider and Dr Karl-Heinz Hoffmann. As a result, further field work with the Namibian Survey is underway as are research projects on parts of the Survey collections in Windhoek. Work with the local primary and secondary schools is planned – a linkage of Monash University of the Namibian Survey through the Monash Science Centre.

(5) Development of Website for IGCP493

The website should be active from the beginning of 2004.

(6) Popular Book on the Pre-Cambrian (Emphasizing the Neoproterozoic and the Origin of Animals)

A major effort has been made from October to December 2003 to write this book, with a working title (***Beyond the Edge***). Fedonkin, Vickers-Rich and Gehling are the authors. High quality photographs of most every taxon of Vendian/Ediacaran metazoan is in hand (due to major efforts in Moscow, Windhoek and Adelaide over the past year). A substantial amount of the text has been written, Arthur C. Clarke has

provided the Preface, and most of the field data and field photography has been completed. Graphics are underway and Peter Trusler, an internationally recognized reconstruction artist has been engaged to provide a number of illustrations.

A preliminary version of the book will be presented to two interested publishers early in 2004, and it is hoped that this large format, full colour book for a popular audience will be in press by the end of 2004 – a book written for a general audience at a fairly high level, so that it will be useful to both general and scientific audiences.

(7) Planning for meeting of IGCP493 in Prato, August 26-27 at the Monash University Campus to coincide with the International Geological Congress in Florence. See attached invitation document, which has received a significant response.

Signature of Project Leader and Date

2 Dec. 2003