SILURIAN TIMES
No. 10

A NEWSLETTER OF THE SUBCOMMISSION

SUBCOMMISSION ON SILURIAN STRATIGRAPHY
INTERNATIONAL COMMISSION ON STRATIGRAPHY
INTERNATIONAL UNION OF GEOLOGICAL SCIENCES

CONTENTS OF SILURIAN TIMES No. 10:

CHAIRMAN'S CORNER

Dear Colleagues,

I take this opportunity to thank you all, the voting members and corresponding members of the SSS, and those who are interested in Silurian stratigraphy for your concern and support. Thanks to Mike Melchin for doing excellent job on the pervious edition of the SILURIAN TIMES.

As you know, one of our major plans for 2000-2004 is to restudy some of the established Global Stratotype Sections and Points (GSSPs) for the Silurian System. The base of the Silurian System and the base of the Wenlock Series, two highlights have been selected and two relative working groups (led by Mike Melchin and Dave Loydell) established. This work does not mean we have only focused on the boundary. It will bring us better to study the biozones or assemblages of various fossil groups below and above the boundaries at the type sections with the others around the world, correlation of the different zonations, the systematic palaeontology of the different groups, and relative global events, geography, oceanography, and many other subjects.

The purpose of this plan does not mean that the achievements and contributions made by the SSS during the period of later 70's and early 80's have been negated. They established the first, uniform framework within a system and made a Common Language among the global stratigraphers. However, science is in progress and research on the Silurian stratigraphy is not an exception. For example, Mike Melchin and Henry Williams (2000) have made progress in the restudy of the graptolites from the basal Silurian strata at the Dob's Linn section. They have proposed a revision to the biostratigraphical definition of the GSSP, that the lower part of the *Parakidograptus acuminatus* Biozone of Williams (1983) are marked by a primitive form of *Akidograptus ascensus* and *Parakidograptus praematurus*. Thus the basal zone of the Silurian System is the *Akidograptus ascensus* Zone, which is overlain by the *acuminatus* Biozone. Further studies of stratigraphy and palaeontology, either from the stratotype or from other sections around the world, are encouraged.

The establishment of a global stratotype is not a final purpose. The restudy is to better understand the various boundaries, and better correlate the relative, recognizable boundary at the type locality with many other sections in the world. This work, therefore, will be of worth for study of global changes, evolution, palaeoecology, palaeobiogeography, and many other subjects. This work also needs efficient international collaborations and harmonious coordination. I sincerely hope this study during the periord of 2002-2004 will be successful.

I am looking forward to meeting you in Argentina in the August, 2003 (Field Meeting of the Subcommission on Silurian Stratigraphy link with the 9th International Symposium on the Ordovician System and 7th International Graptolite Conference).

All the best,

Rong Jia-yu, 20 May, 2002

EDITOR'S NOTES

This is my second issue of Silurian Times. Silurian Times 9 is still online and both it and ST 10 are directly accessible by links to each other. At some point I may set up a separate home page for the Silurian Subcommission which will contain links to all of the ST issues that can be posted, but that has not happened yet.

In response to one question that I received regarding long-term accessibility of these pages on-line, my plan is to keep each issue that I do accessible for at least as long as I am editor. Beyond that, access will depend on the choices made by the next editor and also, presumably, changes in the internet and the way such documents may be delivered in the future. If you wish to have a permanent copy of any of these issues of ST, the best bet is to either save them to your own computer or else to print them as a hard copy.

In response to another comment received, I have made the background for this issue somewhat "softer", so as to make the text easier to read. The picture is a trilobite that I collected while on one of the field trips of the James Hall Symposium in 1996. I obtained the image simply by scanning the specimen directly.

I wish to thank all of those who took the time and effort to contribute to this issue. My apologies to Barrie Rickards and Tony Wright for the length it took me to get their piece on the Homerian graptolite extinction on line.

Mike Melchin

Annual Report of the Subcommission on Silurian Stratigraphy (SSS) of the International Commission on Stratigraphy for 2001

1. Title of constituent body

Subcommission on Silurian Stratigraphy (SSS)

2. Summary table of Silurian subdivisions

Source: Holland, C.H. and Bassett, M.G. (1989). A Global Standard for the Silurian System, National Museum of Wales, Geological Series No. 9, p. 24.

System		Series	Stages
Silurian	Upper	Pridoli	(no subdivisions)
		Ludlow	Ludfordian
			Gorstian
	Lower	Wenlock	Homerian
			Sheinwoodian
		Llandovery	Telychian
			Aeronian
			Rhuddanian

No changes or additions to this scheme have been made during the last seven years. As recently as the last biennial meeting of the SSS in Spain in 1998, the membership confirmed its majority support for the status quo. New officers of the subcommission did not take the decision to reopen nominclatural questions after July 2000 at the biennial meeting of the SSS in Australia, July 2000. However, they did agree that some boundary stratotypes required re-examination (see below).

3. Overall objectives

a) Elaboration and improvement of the standard global stratigraphical (SGS) scale for the Silurian System, including definition of boundaries and the selection of Global Stratotype Sections and Points (GSSP) under IUGS guidelines.

b) Refinement of international correlation within the Silurian System, with particular emphasis on development of a generalized scheme of zonal fossils (left-hand column) for global applications.

c) Stimulation of research and international cooperation, with particular emphasis on the coordination of working groups focused on various zonal fossils such as graptolites, conodonts, chitinozoans, etc.

d) Evaluation and integration of new approaches to the correlation of Silurian strata on a global scale.

4. Organization

The SSS is a subcommission of the International Commission on Stratigraphy, consisting of 15 Voting and 48 Corresponding members. Voting members are selected to achieve regional representation and a balanced stratigraphic expertise. Corresponding membership is open to all individuals demonstrating a commitment to scholarship in Silurian stratigraphy.

Officers:

Chairman: Rong Jia-yu (Nanjing Institute of Geology and Palaeontology, Academia Sinica, Nanjing 210008, People's Republic of China).

Vice-chairman: Tatjana N. Koren (All Russian Geological Research Institute - VSEGEI, Sredny pr. 74, 199026, St. Petersburg, Russia).

Secretary: Michael J. Melchin (Department of Geology, St. Francis Xavier University, P.O. Box 5000, Antigonish, Nova Scotia B2G 2W5, Canada).

The SSS Treasury is maintained as a separate organizational account at St. Francis Xavier University.

5. Extent of national/regional/global support of projects

Membership in the SSS is represented by specialists from 29 countries and from all continents except Antarctica. Most of the major regions of the world with extensive exposures of Silurian strata are covered, especially Eurasia, North America, South America, Australia, and Africa.

The 3rd and 2nd International Symposia on the Silurian System (convened in Rochester, N.Y. in August 1996 and in Orange, New South Wales (Australia) in July 2000 under sponsorship of the SSS) enjoyed significant financial support from educational institutions, private science foundations, and corporate sponsors. Institutional support will also be provided for the upcoming Silurian Field Meeting in Argentina (August, 2003). Ongoing grant support exists for symposia publications through the cooperation of the New York State Museum (Albany) and the Australian Museum (Sydney).

Substantial national-based support was contributed for other SSS field meetings in Australia (2000), Spain and Portugal (1998), Austria (1994), the Czech Republic (1992), Estonia (1990), Australia (1986), the Ukraine (1983), Norway (1982), Canada (1981), and the United Kingdom (1979, 1989).

6. Interface with other international projects

SSS members are very active in the IPA international research groups on graptolites, conodonts, chitinozoans, and vertebrates. In addition, there is

considerable overlap of the activities of many SSS members with the Subcommission on Ordovician Stratigraphy, particularly regarding the events surrounding the Late Ordovician mass extinction event and subsequent biotic recovery. The SSS field conference held in Spain and Portugal in 1998 was arranged to coincide with the Sixth International Graptolite Conference. The 2003 SSS field conference is scheduled to be held in connection with the International Graptolite Conference and an International Symposium on the Ordovician System in Argentina.

7. Accomplishments and products generated in 2001

The ninth issue of *Silurian Times* - the official newsletter of the Silurian Subcommission (edited by Secretary Mike Melchin) was circulated in April 2001 to all subcommission members, as well as a broad constituency of Silurian researchers around the world. This is the first year that the newsletter was produced as a world-wide web document and it forms the main part of a new WWW Site for the SSS. Almost all SSS members were able to read the document in this way and relatively few copies needed to be circulated through the normal postal system. By this means, the SSS continues to realize substantial savings in postal costs. In addition, this form of transmission of Silurian Times means that all researchers and members of the general public who have an interest in the Silurian System can learn of the activities of the SSS. In addition, updates to the site can be posted at intervals other than the annual time of delivery so that the news can remain more current.

A decision was made that some the GSSPs of the Silurian System should be re-examined in light of the experience that researchers have had in using these GSSPs as well as new information that had become available since they were established. This decision was based on discussions that took place at the most recent meeting of the SSS in Australia (July 2000), and subsequently received the support of the majority of titular members. It was also decided that initially two stratotypes should be restudied, possibly with others to follow. The two that will be restudied are the Base of Silurian and Base of Wenlock. Full discussions of the rationale for conducting these restudies can be found in the Silurian Times web site at: http://iago.stfx.ca/people/mmelchin/os-gssp9.htm
and: http://iago.stfx.ca/people/mmelchin/lw-gssp9.HTM.

Two SSS titular members have been asked to organize new boundary restudy working groups: Mike Melchin (Canada) for the Base of Silurian; and David Loydell (UK) for the Base of Wenlock. They have been given the mandate to organize a working group with broad representation internationally as well as among researchers in the various biostratigraphic and stratigraphic fields that bear upon problems of international correlation. The process of forming these working groups has begun.

The other project that has begun in earnest in 2001 was the planning of the next field meeting of the SSS, in Argentina in 2003, in connection with an Internation Symposium on the Ordovician System and an Internation Graptolite Conference. Field trips itineraries are planned to include many well-known Silurian localities in the Argentine Precordillera. Mike Melchin has been asked to serve as

Technical Programme Co-ordinator for the in-house portion of the Silurian Field Meeting, with assistance from Argentine colleagues. Information pertaining to this conference can be found at: http://iago.stfx.ca/people/mmelchin/isos-igc-sss1.HTM.

8. Chief problems encountered in 2001

A decision was taken in 1998 to divide the keynote manuscripts from the 2nd International Symposium on the Silurian System into two volumes, based on the length of the early manuscripts submitted for editorial review. The last manuscript necessary for the volume on "Silurian Lands and Continental Margins, Exclusive of North America" was collected in March and has now gone through technical and peer reviews. As a result of delays in the review and revision process, the entire volume should be ready to go to press by the end of 2001 or early in 2002.

9. Work plan for 2002

As noted above, the boundary working groups are in the process of being established to restudy the GSSPs at the Base of Silurian and Base of Wenlock. The first step in the restudy process will be an examination of the current GSSP, to see if it adequately serves its purpose of providing a precise frame of reference for workers taking a variety of approaches in stratigraphic correlation. These studies will particularly consider information that has come to light since the establishment of these GSSPs. If such study finds that the current GSSP does not provide an adequately precise and useful point of reference for international correlation, then the task of seeking an alternative GSSP will be undertaken.

In addition to the work on GSSPs, the SSS executive is also concerned with the relative scarcity of reliable geochronological dates that are biostratigraphically well constrained within the Silurian System. At the present time, a small group of Ordovician and Silurian workers are compiling all available data on radiometric dates applicable to the calibration of the Silurian time scale as part of the production of the next edition of "The Geologic Time Scale" for Cambridge University Press. They have also been developing new means of integrating biostratigraphic and geochronologic data into a composite, linear time scale. Once this work has been completed, the SSS executive will consider ways to improve the situation by encouraging its members to collaborate in projects that provide new calibrations for Silurian time. This will also be one consideration of the working groups restudying GSSPs.

Another priority of the SSS is development of a more refined correlation between the graptolite zonation, which mainly represents the basinal facies, and the conodont, palynomorph, and shelly fossil zonations of the shallow marine strata. This is a continuing effort of the Subcommission.

Publication of "Silurian Lands and Continental Margins, Exclusive of North America" by the end of 2001 or early in 2002 will permit work to begin on the third volume from the James Hall Symposium, "Silurian Lands and Continental Margins of North America".

Planning will continue for the Silurian Field Meeting in Argentina, to be held in August, 2003.

The secretary plans to provide web-based archival access to previous issues of Silurian Times, once the new issue is released early in 2002. The plan is to have these available as PDF downloads from the Silurian Times web site.

10. Potential funding sources outside IUGS

A publication fund, based on revenues raised for the James Hall Meeting and ongoing grant contributions is established. These funds are being released to the New York Geological Survey in order to cover initial editing costs of symposium volumes. Other potential funds through the New York State Museum may facilitate publication based on anticipated reimbursement from sales of symposium volumes. The 1998 volume entitled "Silurian Cycles - Linkages of Dynamic Stratigraphy with Atmospheric, Oceanic, and Tectonic Changes" (New York State Museum Bulletin 491, 327 p.) has enjoyed a solid sales profile.

11. Financial statement for 1999

Income (U.S. dollars)	
1. Carryover from 1999	$ 30.97
2. 2000 ICS subvention	200.00
Total operating funds	230.97
Expenditures	
1. Newsletter production	78.00
2. Postage	20.70
3. Technical (student) assistance with setup of Silurian Times web page (15 hrs @ $8/h)	120.00
Total expenditures for 2001	$218.70
Net balance at the end of 2000	$22.27

12. Budget for 2001

1. Production & mailing of newsletter	$100.00
2. Purchase of software (Adobe Acrobat, full version) for archival storage and deliver of Silurian Times	$50.00
3. Student technical assistant for archival storage and delivery of Silurian Times (10 hrs @ $8/hr)	$80.00
Total Budget for 2002	$230.00
ALLOTMENT REQUESTED FROM ICS FOR 2000 -	$200.00

Name of Chairperson: Rong Jia-yu

Date: November 27, 2001

Address: Nanjing Institute of Geology and Palaeontology, Academia Sinica, Nanjing 210008, People's Republic of China

Telephone and Fax: 25-3282169
e-mail: jyrong@nigpas.ac.cn
Titular members SSS

Rong, Chairman (China)
Koren, Vice-chairman (Russia)
Melchin, Secretary (Canada)
Brett (U.S.A.)
Caputo (Brazil)
Cocks (UK)
Le Hérissé (France)
Jell (Australia)
Johnson (U.S.A)
Kaljo (Estonia)
Kriz (Czech Rep.)
Lenz (Canada)
Loydell (U.K.)
Serpagli (Italy)
Verniers (Belgium)

Corresponding members SSS

Aldridge (UK)
Antoskhina (Russia)
Baarli (USA)
Barnes (Canada)
Bassett (UK)
Berry (US)
Bjerreskov (Denmark)
Bleick (France)
Boucot (US)
Chen (China)
Chlupac (Czech Rep.)
Dufka (Czech Rep.)
Einasto (Estonia)
Ferretti (Italy)
Fu (China)
Geng (China)
Gutierrez-Marco (Spain)
Hansch (Germany)
Holland (Ireland)
Jeppsson (Sweden)
Jin (China)
Kozlowska-Dawidzuik (Poland)
Larsson (Sweden)
Laufeld (Sweden)
Lawson (UK)
Legrand (France)
Lesperance (Canada)
Mannik (Estonia)
Marsss (estonia)
Maletz (Germany)
Musteikis (Lithuania)
Nestor (Estonia)
Norford (Canada)
Paris (France)
Peralta (Argentina)
Picarra (Portugal)
Bogolepova (Russia)
Predtechensky (Russia)
Rickards (UK)
Robardet (France)
Simpson (Australia)
Schonlaub (Austria)
Sennikov (Russia)
Storch (Czech Rep.)
Strusz (Australia)
Su (China)
Teller (Poland)
Tesakov (Russia)
Walliser (Germany)
Yolkin (Russia)
Wang (China)
Zhang (China)

EVALUATING THE SERIES AND STAGES OF THE SILURIAN SYSTEM

by

Jorg Maletz, Manfred Menning, Thomas Heuse & Dietmar Leonhardt (In the name of the German Subcommission on Silurian Stratigraphy)

The Stratigraphic Commission of Germany is preparing a Stratigraphic Table of Germany 2002 as a reference scale for the lithostratigraphical units found in Germany to be presented as a first draft at the Meeting of the German Geoscientific Societies in Wuerzburg, October 2002. For this purpose the international chronostratigraphic scheme used for correlation of the units was discussed in some detail. It was felt that the Silurian subdivision was exceedingly uneven and the German Subcommission of Silurian stratigraphy was asked whether there are any attempts to modify the scheme to attain a more even spacing of chronostratigraphic units in the Silurian.

The major points of concern is the high number of Series in the Silurian System (4) and that the Pridoli is not differentiated into stages, as well as the extremely unequal length of the individual Series. All Phanerozoic systems consist of two respectively three series and six to 12 stages and all series are differentiated into stages. This fundamental principle of hierarchical balance should have priority and also be attempted for the Silurian System. Moreover, the Silurian is one of the shortest systems with a length estimated at about less than 30 Ma and the Pridoli is by far the shortest series, generally estimated at about 2 Ma to less than 5 Ma.

According to the recent chronostratigraphic scale of Gradstein & Ogg (1996) the Llandovery (15 Ma) alone is longer than the rest of the Silurian (11 Ma) with the Pridoli representing only about 2 Million years. In this respect it was suggested to include the Pridoli as a stage within the Ludlow (with a length of 4 Ma also being of relatively short duration), a step that would considerably enlarge the Ludlow to about 6 Ma in length. Instead of being the only unit in the Phanerozoic time scale with four series, the Silurian would then include the three series Llandovery, Wenlock and Ludlow. The Pridoli would become a stage in the Ludlow Series. This also would be a better alignment with the overlying and underlying Devonian and Ordovician Systems, both including three series and six to seven stages. Consequently the change would serve the purpose of gaining a more even spacing for the series and stages in the Paleozoic.

The time scale of the International Commission on Stratigraphy (ICS 2002) shows the Silurian to range from 440 Ma to 417 Ma. It allocated 12 Ma to the Llandovery, 5 Ma to the Wenlock, 4 Ma to the Ludlow, and 2 Ma to the Pridoli. The International Stratigraphic Chart of the IUGS (2002) shows the Subdivision of the Silurian somewhat differently. The base of the Silurian is taken at 430 Ma and the top is at 410 Ma. In this chart the Llandovery and the Wenlock are only 5 Ma long, but the Ludlow is estimated to be 10 Ma and the Pridoli again 5 Ma long. This is certainly not in accordance with data in Gradstein & Ogg (1996), but it is not our intent to solve these detailed problems.

The time span of the Pridoli has been debated extensively and has been cited as long as 10 Ma (Kleffner 1989, 1995) and as short as 1.5 Ma (Fordham 1998), with a short age preferred in most newer references. Tucker & McKerrow (1995), Tucker et al. (1998) and McKerrow & van Staal (2000) suggest a length of 2 Ma for the Pridoli and Fordham (1998) allows only 1.5 Ma for this interval. As there is no stage shorter than 2 Ma in the entire Paleozoic, the Pridoli with a duration of around 2 Ma can conveniently be classified as a stage and hardly be kept as a stratigraphic unit of a higher rank. It appears to be too short to be recognized as a series in any international

standard and its usefulness might be questioned. It also represents the only series in the whole Phanerozoic without a stage division. According to the roles of the ICS (Salvador 1994) a stage should be correlatable globally, which is undoubtedly the case with the Pridoli.

Surprisingly the graptolite biozonation has been very tight and the Pridoli has been subdivied locally into at least 9 biozones (Urbanek & Teller 1997). This is the finest biozonation available for the whole Silurian interval, but its applicability on a larger, international scale is not proven. Thus, these graptolite biozones must be regarded as local zones without any relevance for a worldwide differentiation within the Pridoli.

There might be an argument to keep the Pridoli as a series due to the attempt to stabilize the international chronostratigraphic time scale. This, however, is in our opinion, not based on sound scientific grounds, but on historical reasoning and might not be a convincing argument.

We here propose to include the Pridoli as a stage in the Ludlow Series, thus restricting the number of Series in the Silurian System to three. We ask the members of the Subcommission on Silurian Stratigraphy and all interested Silurian workers for their comments and discussion.

References.

Fordham, B.G. 1998. Silurian time: how much of it was Pridoli? In: Gutiérrez-Marco, J. C. & Rábano, I. (eds.): Proceedings of the Sixth International Graptolite Conference of the GWG (IPA) and the SW Iberia Field Meeting 1998 of the International Subcommission on Silurian Stratigraphy (ICS-IUGS). - Temas Geologico-Mineros ITGE **23**, 80-84.

Gradstein, F.M. & Ogg, J. 1996. A Phanerozoic time scale. - Episodes **19**, 3-5.

International Commission on Stratigraphy (2002): www.micropress.org/stratigraphy.

International Union of Geological Sciences (2002): www.iugs/pubs/intstratchart.htm.

Kleffner, M.A. 1989. A conodont-based Silurian chronostratigraphy. - Geological Society of America Bulletin **101**, 904-912.

Kleffner, M.A. 1995. A conodont- and graptolite-based Silurian chronostratigraphy. In: Mann, K.O. & Lane, H.R. (eds.): Graphic correlation. - Society for Sedimentary Geology Special Publication **53**, 159-176.

McKerrow, W.S. & van Staal, C.R. 2000. The Palaeozoic time scale reviewed. In: Franke, W., Haak, V., Oncken, O. & Tanner, D. (eds.). Orogenic processes; qualification and modelling in the Variscan Belt. Geological Society Special Publication **179**, 5-8.

Salvador, A. (1994). International stratigraphic guide: a guide to stratigraphic classification, terminology and procedure. International Union of Geological Sciences. International Subcommission on Stratigraphic Classification, XIX+214 pp.

Tucker, R.D. & McKerrow, W.S. 1995. Early Paleozoic chronology - a review in light of new U-Pb zircon ages from Newfoundland and Britain. Canadian Journal of Earth Sciences **32**, 368-379.

Tucker, R.D., Bradley, D.C., Straeten, C.A.V., Harris, A.G., Ebert, J.R. & McCutcheon, S.R. 1998. New U-Pb zircon ages and the duration and division of Devonian time. Earth and Planetary Science Letters **158**, 175-186.

Urbanek, A. & Teller, L. 1997. Graptolites and stratigraphy of the Wenlock and Ludlow Series in the East European Platform. Palaeontologia Polonica **56**, 23-57, pls. 1-4.

Thomas Heuse, Thuringer Landesanstalt fur Umwelt und Geologie, PF 24, D-07727 Jena, Germany, t.heuse@tlugjena.thueringen.de

Dietmar Leonhardt, Sachsisches Landesamt fur Umwelt und Geologie, Postfach 1341, D-09583 Freiberg, Germany, Dietmar.Leonhardt@lfug.smul.sachsen.de

Jorg Maletz, Department of Geology. State University of New York at Buffalo, 771 Natural Sciences and Mathematics Complex, Buffalo, New York 14260-3050, U.S.A., e-mail: jorgm@acsu.buffalo.edu
Manfred Menning, GeoForschungsZentrum Potsdam, Telegrafenberg C128, D-14471 Potsdam, Germany, e-mail: menne@gfz-potsdam.de

PRELIMINARY REPORT ON THE DEVELOPMENT OF AN ORDOVICIAN-SILURIAN BOUNDARY WORKING GROUP

by MIKE MELCHIN, Department of Earth Sciences, St. Francis Xavier University, Antigonish, NS B2G 2W5, Canada, mmelchin@stfx.ca

In Silurian Times 9 (2001) I wrote an article noting that the Voting Members of the Subcommission on Silurian Stratigraphy agreed that the GSSP for the Base of the Silurian System requires restudy (click here to see this arcticle). They asked me to organize a new Ordovician-Silurian Boundary Working Group to conduct this restudy. Accordingly, I asked all members of the SSS and SOS for expressions of interest in participation in this working group. The following members expressed varying degrees of interest:

Guillermo Albanesi - Argentina
Gladys Ortega - Argentina
Fons Vandenberg - Australia
Chen Xu - China
Rong Jiayu - China
Wang Xiaofeng - China
Tatiana Koren' - Russia
Svend Stouge - Denmark
David Harper - Denmark
Robin Cocks - UK
Howard Armstrong - UK
Alan Owen - UK
Ken Dorning - UK
Phillipe Legrand - France
Alain LeHerissé - France
Florentin Paris - France
Jacques Verniers - Belgium
Rob Ripperdan - Puerto Rico
Stan Finney - USA
Mike Murphy - USA
Brian Chatterton - Canada
Godfrey Nowlan - Canada
Paul Copper - Canada
Mike Melchin - Canada

Other commitments have prevented me from progressing very far with the organization of this group, but two proposals have been presented at this time. One is the proposal presented by Melchin and Williams (2000) for a biostratigraphic revision of the current GSSP, Dob's Linn. The second, which is included here as a separate article, is the proposal by Chen and Rong for consideration of the Wangjiawan Section, China. Paul Copper has also noted that a wealth of new data have become available from Anticosti Island and that further work is in progress and proposed for O/S boundary sections there.

Other expressions of interest and discussion of this matter are welcome.

Mike Melchin <mmelchin@stfx.ca>
Department of Earth Sciences
St. Francis Xavier University
Antigonish, NS, B2G 2W5, Canada
Phone: (902) 867-5177
Fax: (902) 867-2457

A Proposal of the Candidate Section of the Base of the Silurian

Chen Xu and Rong Jia-yu
(Nanjing Institute of Geology and Palaeontology, Chinese Academy of Sciences)

Since the Dob's Linn section was ratified by the IUGS as the GSSP of the base of Silurian System 17 years ago, this stratotype has been the subject of debate. Recently, most of the titular members of the Silurian Subcommission agreed that the base of the Silurian System should be restudied. Melchin and Williams (2000) re-studied the Dob's Linn section and revised the definition of the base of the Silurian System. Based on the studies of the base of the Silurian from the Yangtze Gorges, in particular the Wangjiawan sections, Yichang, W Hubei, China, we propose here that the Wangjiawan South section may be considered to one of the candidate sections for re-studying of the base of the Silurian.

The Ordovician and Silurian rocks from the Yangtze Gorges were first investigated by Lee and Chao (1924) and the fossils described by Grabau (1924) and Sun (1933). The boundary between the Ordovician and Silurian and the related fossils have been studied by Yin (1949), Mu (1945, 1954, 1962), Ge, Rong *et al*. (1979), Mu *et al*. (1984), Rong (1984), Mu, Boucot *et al*. (1986), Wang (1987), Rong and Harper (1988), and Chen, Rong *et al*. (2000). An international research group, including Chen Xu, Rong Jia-yu, Fan Jun-xuan, Zhan Ren-bin, M.J. Melchin, D.A.T. Harper, and C.E. Mitchell, is working on the project since the last decade. The biostratigraphy through the Ordovician and Silurian transition (Chen *et al*., 2000), the distribution of the *Hirnantia* fauna (Rong *et al*., 2002, in press), the Hirnantian graptolite fauna and the extinction - survival - recovery bioevents through this time interval (Chen et al., in prep.) have been published or will be published in the coming years. The research group is working on the early Rhuddanian graptolites and the related shelly fossils from the Wangjiawan sections as well as from the other areas of the Yangtze region.

The Wangjiawan Ordovician-Silurian sections yield the Ashgillan Linhsiang Formation, Wufeng Formation, and Kuanyinchiao Beds as well as the Llandovery Lungmachi Formation in ascending order. Three continuous sections through the Ordovician-Silurian boundary, including the Wangjiawan South, Wangjiawan North and the Wangjiawan River side sections, have been studied. Two of these sections were also investigated by the Ordovician Subcommission delegation in 1978, by the participants of the International Symposium of the Ordovician-Silurian Boundary in 1983, of the Fourth International Graptolite Working Group in 1990, and of the IGCP 410 Project field meeting in 1998. During the past 20 years, these sections have also been studied by many colleagues from different countries. The Wangjiawan South section is recommended here as a candidate section of the base of the Silurian. We recognize the potential of the Wangjiawan South section and the nearby Wangjiawan North and Wangjiawan River side sections into the following aspects.

1. The continuity of sedimentation and biozonation. As we published in Chen et al. (2000) the Wangjiawan sections show continuous sedimentation through the *persculptus - ascensus - acuminatus* zonal interval. Also, it is clear that the sedimentation and the biozonation are continuous through the whole Ashgillian to early Llandovery strata in the Wangjiawan sections.

2. Completeness of exposures. The outcrop through Ordovician and Silurian at Wangjiawan extends 200 m along the roadside and about 100 m along the riverside. No unconformities exist in this interval. Similar strata across the Ordovician-Silurian boundary are exposed at

Huanghuachang, Fenshiang, Wangjiawan, and Tangya, north of the Yichang city along the local highway between Yichang and Nanzhang within a distance of 30 km.

3. Both the graptolites and the shelly fossils are well developed. The shelly *Hirnantian* fauna is known through middle *extraordinarius-ojsuensis* Zone to lower *persculptus* Zone. Trilobites (Zhu and Wu, 1983), nautiloids (Zou, 1985), and other microfossils (Chen *et al*., 2000; Wang *et al*., 1987) are also present.

4. Adequate thickness of sediments. At Wangjiawan South section, the Hirnantian *extraordinarius-ojsuensis* Zone is 0.46 m, the Kuanyinchiao Beds (*Hirnantia* beds) is 0.31m, the *persculptus* Zone is 0.34 m, the *ascensus* Zone is 0.21 m, and the *acuminatus* Zone is 1.68 m. Compared with the other well-known graptolite-bearing sections, this is certainly a condensed section.

5. Abundance and variety of well-preserved fossils. Both of the graptolites and shelly fossils are well preserved, in particular, at the Wangjiawan South section. Unfortunately, conodonts are rare because of the absence of the carbonates through the Ordovician-Silurian boundary.

6. Favorable facies and widespread correlation. Both of the graptolite facies Ashgillian and Llandovery strata and the shelly *Hirnantia* beds are well developed. The graptolite biozones and the *Hirnantia* fauna possess good potential for global correlation (Chen *et al*., 2000).

7. Freedom from structural complication. There is no faulting or folding at Wangjiawan.

8. Metamorphism and other alteration. It is not high degree of metamorphism and thermal alteration. We are working on the palynological, magnetostratigraphic and chemostratigarphic studies. Wang Kun *et al.* (1993) have published their chemostratigraphic result from this area.

9. Amenability to isotopic age determination. A few bentonites through the Ordovician-Silurian transition provide the potential for determine the radiometric dates. A preliminary result has been published by Ross and Naeser (1984) based on the sample from the Wufeng Formation of Yichang. Samples from the Wufeng Formation and the lower Lungmachi Formation have been prepared from the Yangtze region recently.

10. Accessibility. The Wangjiawan South section and the other two, Wangjiawan north and Wangjiawan River side sections are all present on both side of the local high way between Yichang and Nanzhang. There is about one hour drive from the Yichang city to Wangjiawan. Daily local bus between Yichang and Wangjiawan is also available. The traveling, including airline, railway, buses, and ships along the Yangtze River between Yichang and big cities of China are available and comfortable. Tickets can be booked or ordered abroad or within China.

In summary, we propose that the Wangjiawan South section would be a good candidate for the re-study of the base of Silurian. We expect to submit a final report in the near future.

References

Chen Xu, Rong Jia-yu, Mitchell, C.E., Harper, D.A.T., Fan Jun-xuan, Zhan Ren-bin, Zhang Yuan-dong, Li Rong-yu and Wang Yi, 2000. Late Ordovician to earliest Silurian graptolite and brachiopod biozonation from the Yangtze region, South Chian with a global correlation. Geological Magazine, 137(6):623-650.

Ge Zhi-zhou, Rong Jia-yu, Yang Xue-chang, Liu Geng-wu, Ni Yu-nan, Dong De-yuan and Wu Hong-ji, 1979. Silurian System of Southwest China. *In*: Nanjing Institute of Geology and Palaeontology, Academia Sinica (ed.), The Carbonate biostratigraphy of Southwest China, Science Press, Beijing, 155-200 (in Chinese).

Grabau, A. W., 1924. Stratigraphy of China, part I, Paleozoic and Older. 1-528. Geological Survey and Ministry of Agriculture and Commerce of China, Peking.

Lee, J. S. and Chao, Y. T., 1924. Geology of the Gorge District of the Yangtze (from Ichang to Tzekuei) with special reference to the development of the Gorges. Bulletin of the Geological Society of China, 3:351-391 (in English).

Melchin, M. J. and Williams, S. H., 2000. A restudy of the akidograptine graptolites from Dob's Linn and a proposal redefined zonation of the Silurian Stratotype. Palaeontology Down Under 2000. Geological Soceity of Australia, Abstracts: 61-63.

Mu En-zhi 1945. Graptolite faunas from the Wufeng Shale. Bulletin of the Geological Society of China, 25. 201-209 (in English).

Mu En-zhi, 1954. On the Wufeng Shale. Acta Palaeontologica Sinica, 2(2):153-170 (in Chinese)

Mu En-zhi. 1962. Silurian of China. Science Press, Beijing (in Chinese).

Mu En-zhi, Boucot, A.J., Chen Xu and Rong Jia-yu. 1986. Correlation of the Silurian Rocks of China. The Geological Society of America, Special Paper, 202, 1-80.

Mu En-zhi, Zhu Zhao-ling, Lin Yao-kun, and Wu Hong-ji 1984: The Ordovician-Silurian Boundary sections of Yichang Area, W. Hubei. In Nanjing Institute of Geology and Palaeontology, Academia Sinica (ed.), Stratigraphy and Palaeontology of Systemic Boundaries in China, Ordovician-Silurian Boundary. 15-41. Anhui Science and Technology Publishing House (in English).

Rong Jia-yu 1984. Distribution of the *Hirnantia* fauna and its meaning. In. Bruton, D. L. (ed.), Aspects of the Ordovician System. 101-112. Universitetsforlaget, Oslo (in English).

Rong Jia-yu, Chen Xu, and Harper, D.A.T., 2002. The latest Ordovician *Hirnantia* Fauna (Brachiopoda) in time and space. Lethaia (in press).

Rong Jia-yu and Harper, D.A.T. 1988: A global synthesis of the latest Ordovician Hirnantian brachiopod faunas. Transactions of the Royal Society of Edinburgh: Earth Science, 79:383-402 (in English).

Ross, R.J.Jr, and Naeser, C.W. 1984. The Ordovician time scale - New refinements. In Bruton, D.L. (ed.), Aspects of the Ordovician System. Palaeontological Contributions from the Universoty of Oslo, 295:5-10.

Sun, Y.C., 1933. Ordovician and Silurian graptolites from China. Palaeontographica Sinica, B(14): 1-52 (in English).

Wang Kun, Orth, C.J., Moses, A. Jr., Chatterton, B.D.E., Wang Xiao-feng, and Li Ji-jin 1993. The great latest Ordovician extinction on the South China Plate: Chemostratigraphic studies of the Ordovician - Silurian boundary interval on the Yangtze Platform. Palaeogeography, Paaleoclimatology, Palaeoecology, 104:61-79.

Wang Xiao-feng, Ni Shi-zhao, Zhen Qing-lan, Xu Guang-hong, Zhou Tian-mei, Li Zhi-hong, Xiang Li-wen, and Lai Cai-gen, 1987. Biostratigraphy of the Yangtze Gorge area 2: Early Palaeozoic Era, 1-641 (in Chinese with English summary).

Yin Zan-xun (Yin, T.H.) 1949. Tentative classification and correlation of Silurian rocks of South China. Bulletin of the Geological Society to China, 29: 1-62 (in English).

Zhu Zhao-ling and Wu Hong-ji, 1984. The *Dalmanitian* fauna (trilobite) from Huanghuachang and Wangjiawan, Yichang County, Hubei Province. In Stratigraphy and Palaeontology of Systemic boundaries in China, Ordovician-Silurian boundary, (1):83-104. Anhui Sciences and Technology Publishing House (in English).

Zou Xi-ping 1985. Late Ordovician Nautiloids from Wufeng Formation of Jinxian, Anhui. Acta Palaeontologica Sinica, 24(6): 605-614 (in Chinese with English summary).

THE LLANDOVERY-WENLOCK BOUNDARY: SUMMARY OF VIEWS EXPRESSED

David K. Loydell, School of Earth and Environmental Sciences, University of Portsmouth, Burnaby Road, Portsmouth PO1 3QL, UK (David.Loydell@port.ac.uk)

Thank you to those of you who responded to my request in the Silurian Times for your views on the Llandovery-Wenlock boundary. These are summarised below, although I initially quote extensively from Professor Richard Aldridge's submission, the sentiments expressed being in accord with many that I received.

'General considerations

There is no doubt that from time to time boundary stratotypes defined by previous generations of scientists will prove to be unsatisfactory and a change will be desirable. However, it is imperative that when such changes are made they constitute an unequivocal and significant improvement on the previous situation and that they provide the promise of long-term stability in terms of a wide variety of correlation criteria (e.g. macrofossils, microfossils, palynomorphs, chemostratigraphy). It is essential that we do not generate a situation where boundaries are repeatedly redefined or the result will be chaos.

If the Silurian Subcommission is to be the first to revisit formally defined boundary stratotypes, then it has a singular responsibility to undertake any revisions with particular care and rigour. It must be demonstrable to the wider stratigraphical community that the changes (a) are absolutely essential, (b) are fully agreed by the interested scientific community, and (c) constitute a significantly improved and patently stable definition. Any change must not just satisfy current concerns, but must look forward to all foreseeable uses of the stratotype.

I, therefore, urge the members of the Silurian Subcommission to be extremely cautious about making changes - they are setting precedents that will be followed by those working on other systems (or, if it is done badly, criticised by them as examples of bad practice).'

(Prof. R. J. Aldridge, 28/6/01)

'At what level should the base of the Wenlock be placed?'

To this question I received the following responses.

From graptolite workers - from a stability viewpoint most favoured the base of the *Cyrtograptus centrifugus* Biozone, with the *Cyrtograptus insectus* Biozone preferred where it had traditionally been the basal Wenlock graptolite biozone.

From conodont workers - using the Irerviken Event Datum Points, Datum Points 2, 3, 4 and 6 have been suggested as possibilities. Of these Datum Point 2 (approximately the level of the existing 'Golden Spike') was most popular, followed by Datum Point 3.

From a chitinozoan worker - either the base of the *Margachitina banwyensis* Biozone or the base of the *Margachitina margaritana* Biozone.

From an acritarch worker - the base of the *Deunffia brevispinosa* acritarch Biozone.

The GSSP for the Base of the Wenlock Series

Several research projects are under way that may enable a decision to be made in the future regarding whether Hughley Brook should be retained or whether a superior replacement is available. It is clear that at the current state of knowledge it would be very difficult (i.e. foolish) to make any decision.

Projects that will have a bearing on the future decision-making process include those of

Gary Mullins (University of Leicester) - chitinozoans from Hughley Brook (Gary is also looking for any identifiable graptolites in the palynological residues).

David Gelsthorpe (University of Leicester) - acritarchs through the Ireviken Event on Gotland.

David Loydell (University of Portsmouth) and Lennart Jeppsson (University of Lund) - graptolites from the Lower and Upper Visby Beds of Gotland.

David Loydell (University of Portsmouth), Peep Männik and Viiu Nestor (Tallinn Technical University) - integrated stratigraphy of cores from Latvia and Estonia.

Mike Melchin (St Francis Xavier University, Antigonish) - leading a team looking at the integrated stratigraphy through the Llandovery-Wenlock boundary in the Canadian Arctic.

Petr Štorch (Institute of Geology, Czech Academy of Sciences), Juan Carlos Gutiérrez-Marco (Instituto de Geología Económica CSIC-UCM), Graciela Sarmiento (Universidad Complutense e Instituto de Geología Económica CSIC-UCM) and David Loydell (University of Portsmouth) - integrated graptolite and conodont biostratigraphy in Spain.

If all, or most, of these and other relevant projects currently being undertaken are sufficiently completed, then perhaps it would be appropriate to devote a session to the Llandovery-Wenlock boundary at the next Silurian Subcommission Meeting. For the present it is clear that it is research that is required, not discussions or meetings.

THE LUNDGRENI BI0ZONE MASS EXTINCTION: NOT SO TIDY

BY

R. B. Rickards & A.J. Wright

In a recent issue of Silurian Times (no 9, 2001, p. 44) Lenz and Kozlowska-Dawidziuk discuss what they consider to be two anomalies in the otherwise tidy mass extinction at the end of the *lundgreni* Biozone. The first "anomaly" concerns our 1995 record from Quarry Creek, NSW of *Monograptus* sp. ex. gr. *flemingii* in the *ludensis* Biozone. This they dismiss as "some type of badly deformed pristiograptid", which is quite wrong. We understand that they did not examine all the specimens we figured; nevertheless if one examines Rickards *et al.* (1995, especially but not only Figure 30A) the retroverted hooks are clearly visible. We are in no doubt that these admittedly badly preserved forms are robust *Monograptus* s.s. They also ask for a re-examination

of the Rickards (1970) record of *M. flemingii elegans* Elles from the *ludensis* Biozone. This record was based on a number of findings by the British Geological Survey, so all the collections can be re-examined by anybody. We have already done so. The information was later published by BGS (Warren *et al*., 1984) where they modified the identification to *M. flemingii* aff. *elegans*. There is, therefore, no doubt that in North Wales (Denbigh) a robust *flemingii* - like *Monograptus* occurs in the *ludensis* Biozone. It should also be noted that Warren *et al.* (1984) recorded *P. pseudodubius* (= *P. parvus*; see Rickards *et al.,* 1995) from the *rigidus* Biozone to the *ludensis* Biozone; *P.* aff. *jaegeri* from the *lundgreni - ludensis* biozones; *P. jaegeri* from the *nassa-ludensis* biozones; and *P.* sp. nov.? aff. *curtus* from the *lundgreni-nilssoni* biozones. One cannot simply ignore these inconveniences. We should also mention that Kozlowska-Dawidziuk (1995, Fig. 7) recorded *Paraplectograptus* and *Eisenackograptus* as ranging through much of the Wenlock and just into the Ludlow. Furthermore Lenz (1993) recorded *Agastograptus clathrospinosus* from the *lundgreni* Biozone into the Ludlow, and *Gothograptus eisenacki* from the *lundgreni* Biozone to the top of the *ludensis* Biozone. None of these records supports the statement in the second sentence of the recent Lenz and Koslowska-Dawidziuk contribution to Silurian Times. It may be that the ranges of their forms referred to above have been more recently revised, but if so the Silurian Times article would have been a good place to summarise the changes, given the overall context of their paper. Furthermore, Jenkins (1977) records *M. flemingii* with *M. ludensis* in the Panuara district of NSW: in fact he assures us (*pers. comm.)* that *M. flemingii* and *M. ludensis* occur on the same slabs in the Ulah district of NSW. In the Lake District/Howgill Fells *Monograptus flemingii* does not occur in the *ludensis* Biozone*,* but it certainly overlaps with *G. nassa* s.s. Lenz and Kozlowska-Dawidziuk do not discuss *Monoclimacis ludlowensis,* a Wenlock-like *Monoclimacis* which also occurs in the *nilssoni* Biozone of Quarry Creek and elsewhere in NSW. And then there is the matter of *Monograptus moorsi* described by Rickards and Wright (1997) from Cobblers Creek in NSW. This is an undoubted *Monograptus* s.s. occurring with *M. ludensis, M. sherrardae* and other species. The remarks by Lenz and Kozlowska-Dawidziuk did not deal with other "anomalies". For example Rickards *et al.* (1995) also recorded rare *Testograptus testis* (Barrande) in the *ludensis* Biozone (a species which Rickards and Wright have recently found, rarely, in the *nilssoni* Biozone of NSW, alongside *B. bohemicus*). It is also widely stated (e.g. in the Silurian Times article) that the mass extinction bade farewell to *Cyrtograptus.* This would ignore the record by Rickards *et al.* (1995) of that genus in the *nilssoni* Biozone of Quarry Creek. We have recently found excellently preserved *Cyrtograptus* material in a rich *nilssoni* Biozone assemblage of Bulls Camp Creek (also NSW) confirming our records in Quarry Creek: these forms are almost indistinguishable from some *lundgreni* Biozone cyrtograptids which occur in NSW, as well as on other continents. We should also like to quote from Kozlowska-Dawidziuk, Lenz and Š torch (2001, 162) where they say: "Rickards and Wright (1997) described material from a single collection in New South Wales, Australia, showing morphologic variations ranging from morphs typical of *C. praedeubeli,* to those typical of *C. ludensis,* and, finally to those typical of *C. gerhardi.* Based on these observations they suggested that the three "species" are, in fact, variations within a single species, '*Monograptus ludensis'."* This is quite erroneous. The morphological sequence to which they refer, ranging on the one slab from *M. "praedeubeli"* through *M.* "*ludensis*" to *M. "gerhardi" is* NOT from a single collection in NSW but from Murchison's *type slab of M. ludensis!* Our illustrations clearly state this (Rickards & Wright, 1997, p. 236, Fig. 4 explanation). Whilst there are undoubtedly some sections around the world where these three morphotypes follow each other in time (though not always easy to define or distinguish one from the other; or get the horizons with certainty) there are other sections where all the morphotypes occur as a growth series - young to old - in the one place and the one stratigraphic level. These latter sections appear to be the more offshore, off-shelf, above-slope, or deeper sequences. It is a distinct possibility that early in the *ludensis* Biozone (say *sherrardae* level) *M. "praedeubeli"* - early growth morphotypes - occurs in shallow seas, whereas the full suite of morphotypes occurs off-shelf.

Perhaps then there is greater longevity of the species in off-shelf environments. How then does one explain the apparent sequence of the three morphotypes on the shelf? Well, the recovery from the *lundgreni* Biozone so-called mass extinction was accompanied by a global marine transgression peaking in the *nilssoni* Biozone, so the original shelf seas were deepening through time: hence the occurrence of first two, then three morphotypes occurred. Of course, it must also be remembered that when *M. gerhardi* is recorded - usually toward the end of the *ludensis* Biozone - the *M. praedeubeli* morphotype should occur in the same place because it is the earlier growth stage. All in all it seems to us that the *lundgreni* event and the recovery therefrom is not quite as tidy as Lenz and Kozlowska-Dawidziuk hope for. And why should it be: we have Lazarus taxa and refugia. And, after all, why is it such a big deal to have *M. flemingii* going extinct in the *lundgreni* Biozone, because robust monograptids such as *M. unguiferus* and *M. uncinatus* were present in the *nilssoni* Biozone and presumably evolved from somewhere. Some of these matters are further expanded in a paper Rickards and Wright have submitted on Lazarus taxa, refugia and relict faunas. This should appear in due course.

REFERENCES

Jenkins, C. J. 1977. Llandovery and Wenlock stratigraphy of the Panuara area, Central New South Wales. *Proceedings of the Linnean Society of N.S.W.,* **102,** 109-130.

Kozlowska-Dawidziuk, A., 1995. Silurian retiolitids of the East European Platform. *Acta Palaeontologica Polonica*, **40,** 261-326.

Kozlowska-Dawidziuk, A., Lenz, A. & Š torch, P. 2001. Upper Wenlock and Lower Ludlow (Silurian), post-extinction graptolites, Vseradice section, Barrandian area, Czech Republic. *Journal of Paleontology*, **75,** 147-164.

Rickards, R.B. 1976. The sequence of Silurian graptolite zones in the British Isles. *Geological Journal*, **11,** 153-188.

Rickards, R.B., Packham, G.H., Wright, A.J. & Williamson, P.L. 1994. Wenlock and Ludlow graptolite faunas and biostratigraphy of the Quarry Creek district, New South Wales. *Memoirs of the Association of Australasian Palaeontologists*, **17,** 1-68.

Rickards, R.B. & Wright, A.J. 1997. Graptolite zonation in the late Wenlock (Early Silurian), with a new graptolite-brachiopod fauna from New South Wales. *Records of the Australian Museum,* **49**, 229-248.

Warren, P.T. , Price, D., Nutt, M.J.C. & Smith, E.G. 1984. Geology of the country around Rhyl and Denbigh Memoir for 1:50000 geological sheets 95 and 107, and parts of sheets 94 and 106. Natural Environment Research Council, i-ix, 1-217.

A RESPONSE TO

"THE LUNDGRENI BI0ZONE MASS EXTINCTION: NOT SO TIDY"

BY

Alfred Lenz and Anna Kozłowska-Dawidziuk

Barrie Rickards very kindly gave us a copy of his and Tony Wright's response some months ago, so in the interests of clarification, and to keep this interesting discussion going, we propose to make a further response. As a first comment, however, we fully realize that in some observations and opinions, we will have to "agree to disagree" and hope that future discoveries will clarify matters.

As a way of approaching this, we will begin with a background to the studies leading to our (some might say 'sweeping'!) conclusions. Either one or both of us have, at various times, and in collaboration with several fellow graptolite workers, collected in great detail and literally BED-BY-BED across the lower and upper Homerian interval in Arctic Canada, Poland (borehole cores), Czech Republic, Spain, Portugal, and to a lesser extent, China. In every case, the change from lower to upper Homerian is startling. Furthermore, Koren has collected, in great detail, from a number of very fine sections in Central Asia and we have been privileged to examine this beautifully preserved material. Finally, we have had access to detailed unpublished data generously provided by the late Hermann Jaeger. Based on all these data, all derived from exceedingly well-sampled sections, and all yielding very good to superbly preserved (i.e., isolated, full relief) material, we think it is safe to say that the *lundgreni* extinction event was a profound and traumatic event for the graptolites, and probably equal to that across the Ordovician-Silurian boundary! For example, a comparison of the lower Homerian *lundgreni* Biozone fauna described in Lenz and Kozłowska-Dawdziuk (2001) paper with that of the upper Homerian graptolites described in Lenz and Kozłowska-Dawdziuk (2002) will, we think, convince anyone of the profound differences. Moreover, in NONE of the above regions, and all yielding excellent fossil material, has true *Monograptus* (i.e., those with *Monograptus priodon*-like thecae) been recovered from upper Homerian strata. So, that leaves us with UK and Australia.

As we were very careful to point out in our comments, we have not seen the UK material, and so cannot directly comment on any of the so-called *Monograptus* in the upper Homerian there. That then leaves Australia, where the profound differences in opinions lie. While in the Australian National Museum, we examined material from the Quarry Creek district described in Rickards et al. (1995), especially the so-called *Monograptus flemingii* type, and concluded that it was not true *Monograptus*, but some kind of strangely deformed pristiograptid. Rickards and Wright obviously disagree with us, and comment that the illustrations clearly show retroverted thecae. But, ironically, that is the very point! Yes we readily agree, their photographs, especially that in Rickards et al., (1995, fig. 30A), show a form that appears to possess retroverted thecae. However, when we examined the actual specimens of the illustrated types (and we naturally assume that only the best material was illustrated), we were and still are, fully convinced that this is NOT a 'real' *Monograptus*. So here, we must agree to disagree.

We cannot comment on other reported occurrences of *Monograptus* in upper Homerian beds of Australia, except to say that we are dubious, especially in the case of *Monograptus moorsi* that shows obvious strong tectonic deformation such that the thecae are considerably stretched in the

ventral direction (and presumably again, the illustrated specimens are the best available from the collection).

Having said this, it is of course, logical and reasonable to suggest that somewhere in the Silurian world, *Monograptus* must have lived on into the late Homerian. For one thing, as Rickards and Wright point out (and we fully agree), a taxon that (basically) reappears in the Ludlow must have had a late Homerian antecedent (in) some place(s) in the world. So maybe Australia and UK were such refugia for *Monograptus*, and are therefore, the exceptions to the 'rule'! Nevertheless, we would strongly argue that this in no way detracts from the severity of the *lundgreni* extinction event. By way of comparison, let us assume that some dinosaur stragglers did range into the Paleocene. Would that make the record and ramifications of the K-T extinction event any less profound? We think not!

As for *Monograptus flemingii* occurring with *G. nassa* in the Lake District, can they be sure what this really means? To be sure, recent studies of Kozł owska-Dawdziuk (1990 and subsequent studies), as well as unpublished work by Jaeger, both on isolated and uncompressed material from the Baltic region, record *G. nassa* only from the upper Homerian, whereas they document DIFFERENT, but very closely related species of *Gothograptus* from the underlying *lundgreni* Biozone. Significantly, the older forms also possess solid apertural hoods, and herein arises the problem. In the absence of either isolated material, or possibly of extremely well preserved flattened material, recognition of the various species of true *Gothograptus* is extremely difficult if not impossible. Two questions then remain: is the form associated with the so-called *M. flemingii* really *G. nassa* and, beyond that, do we know the global biostratigraphic range of true *G. nassa* and of the other closely related species of *Gothograptus*?

The supposed upper ranges of *Paraplectograptus*, *Eisenackogaptus* and the lowest occurrence of *Spinograptus clathrospinosus*, as reported by us at various times earlier, are we readily admit, in error, in part because of a drafting error, but mostly because identificationos were based on flattened specimens leading to some misidentifications. A perusal of Lenz and Kozłowska-Dawdziuk (2001 and 2002) will readily demonstrate the more probable ranges of these taxa; namely, *Paraplectograptus*, *Eisenackogaptus* do NOT range above the lower Homerian, whereas *Spinograptus clathrospinosus* first appears only in the upper Homerian, *praedeubeli-deubeli* Biozone.

Finally, two minor issues. We see absolutely no contradiction in the ranges of *Pristiograptus dubius, P. jaegeri and P. parvus* crossing the extinction boundary. In fact, we have commented on this several times elsewhere, as have for example, Jaeger, Koren and Urbanek. That this small and tightly knit clade is present on both sides of the boundary is quite reasonable and, in fact to be expected, in view of the fact that they are the purported ancestors of (almost!) all subsequent monograptids. Likewise, we are not the slightest perturbed that a so-called *Cyrtograptus* with complex thecae occurs in the Ludlow. More importantly from our viewpoint, is the fact that it is NOT in the upper Homerian strata! Perhaps this is another example of a lazarus taxon? We do, however, question the advisability of a non-cladium bearing form being called *Cyrtograptus*, a practice akin to calling a unicycle a bicycle!

We have not addressed all of Rickards and Wright's issues but, hopefully, such useful and friendly discussions and exchanges of information can be continued in future newsletters. Finally, we would like to say that the above discussion in no way detracts from the immense and invaluable contribution that Rickards and his Australian colleagues have made in their many recent studies of the Silurian graptolites of southeastern Australia. They are to be congratulated!

Kozłowska-Dawdziuk, Anna. 1990. The genus *Gothograptus* (Graptolithina) from the Wenlock of Poland. Acta Palaeontologica Polonica, 35: 191-209.

Lenz, Alfred C. and Kozłowska-Dawdziuk, Anna. 2001. Upper Wenlock (Silurian) graptolites of Arctic Canada: pre-extinction, *lundgreni* Biozone fauna. Palaeontographica Canadiana, 20, 61 p.

Lenz, Alfred C. and Kozłowska-Dawdziuk, Anna. 2002. Upper Homerian (Upper Wenlock, Silurian) graptolites from Arctic Canada. Journal of Paleontology, 76: 321-346.

Rickards, R.B., Packham, G.H., Wright, A.J. and Williamson, P.L. 1995. Wenlock and Ludlow graptolite faunas and biostratigraphy of the Quarry Creek district, New South Wales. Memoir of the Association of Australasian Palaeontologists, 17, 68 p.

SILURIAN RESEARCH - 2001-2002

Dick Aldridge(UK) - The last year has been rather quieter than the previous one in terms of Silurian activity, but Gary Mullins and David Gelsthorpe keep me entertained with draft text on acritarchs, and a new research student, David Gladwell (jointly supervised with David Siveter) has started work on the unusual faunas from submarine Ludlow channels in South Shropshire. A small paper on Llandovery conodonts from the Skomer Volcanic Group of SW Wales has also been accepted for publication.

Anna Antoshkina(Russia) - I am continuing work on the Lower Palaeozoic stratigraphy and Palaeozoic reefs of the northern part of the Urals. A detailed lithological investigation of the Silurian rocks has started, and some new result has become.

Howard A. Armstrong (UK) - Over the past couple of years I have been more involved with Ordovician projects. The only papers with direct relevance to the Silurian are listed below. My paper with Pearson and Greselin on single conodont element geochemistry has wider implications and applications. A new project on the end-Ordovician glaciation in Jordan (high latitude Gondwana) has crept into the Silurian with interesting implications for deglaciation and perhaps continued glaciation into the Silurian.

Chris Barnes (Canada) - I continue to complete recent field-based Lower Paleozoic conodont studies in the Canadian Cordillera. Detailed platform to basin transects have been sampled in the southern, central and northern Rocky Mountains (with Leanne Pyle as current PDF). Several papers and a major monograph have appeared recently, are in press or are in preparation. Shunxin Zhang is continuing her Research Associate project using my extensive conodont database to relate conodont biostratigraphy, biofacies and biogeography to the pattern of eustasy and tectonism that affected northern Laurentia in the early Paleozoic, with much of the remaining work dealing with Anticosti Island faunas now completed. Papers in press deal with conodont paleoecology and the response of the conodont communities to eustatic change; another paper is nearing completion on cladisitic analyses.

Richard A. Batchelor (UK) was awarded a Leverhulme Research Fellowship in 2000-2001 to carry out REE, and Sr and Nd isotope analyses on apatite microphenocrysts from Ordovician and Silurian metabentonites. Preliminary results indicate that two separate unique volcanic eruptions in Llandovery times spread over Sweden and Ireland. Isotopic data show that the source of Silurian metabentonites is totally different from that of middle Ordovician metabentonites, and has implications for plate tectonic reconstructions for the Lower Palaeozoic of northern Europe.
Alain Blieck (France) - I continue research in collaboration with Dr. V.N. Talimaa (Lithuanian

Institute of Geology, Vilnius) on Silurian and Devonian heterostracans (vertebrates) from Severnaya Zemlya, Timan-Pechora and other regions of Russia..

Ol'ga K. Bogolepova (Sweden) continues to work in the high Arctic areas of Russia. With regard to a new INTAS project, expeditions to Novaya Zemlya and the New Siberian Islands are planned in the nearest three years. This work, of course, will include the Silurian biostratigraphic, palaeoenvironmental and palaeogeographic aspects. My work in the Silurian is limited at the moment, as we focus mainly on the Cambrian-Ordovician stratigraphy of the lowermost formations overlying the Timanian Orogen complex (TIMPEBAR project, EUROPROBE), however, a paper on the Telychian machaeridians from Severnaya Zemlya (with Annette Hogstrom and Alexander Gubanov) has been prepared and submitted. A paper on the Bohemian type bivalvia from Severnaya Zemlya (presented on PalAss 2000 in Copenhagen) is nearly completed, as well as a manuscript on the Silurian faunas of this area.

Carole Burrow (Australia) - My Ph D was conferred in May 2001, and I spent much of 2001 writing up work covered in the thesis. I attended the Obruchev Symposium 'fishfest' in Moscow (March 2001), and was among the small but diverse gathering at CAVEPS in Christchurch NZ (December 2001). My redescription of the Silurian gnathostomes from the Silverband Formation, the Grampians, Victoria is in press with Alcheringa, and I have submitted a paper to the Journal of Vertebrate Paleontology on a limited acanthodian fauna from the Roberts Mountains Formation (Pridoli), Nevada. My efforts to locate Early Silurian acanthodian fin spines reported from Pennsylvania have come to nought - if anyone out there knows where such beasts might be, I'd love to hear from you! For 2002, my work with a partly Silurian focus includes an attempt to sort out the relationships of acanthodians with dentigerous jaw bones.

Chen Xu (China) - I have two current research projects. 1. late Ordovician to early Silurian mass extinction and recovery. The working group includes Rong Jia-yu, Fan Jun-xuan, Mike Melchin and Chuck Mitchell 2. Ordovician stratype sections (including the restudy of the base of Silurian). The working group includes the mentioned persons as well as Stig Bergström, Zhang Yan-dong and others.

Robin Cocks (UK) - 2001 has been a busy year, with work on (i) an invited review (with Richard Fortey) on palaeontological evidence for continental reconstructions in the Ordovician and Silurian, this has included a detailed review of the relationships through time between the various terranes which make up Asia today, particularly North and South China, Sibumasu and the Kazakh terranes, (ii) work with Trond Torsvik (Trondheim, Norway) on the palaeomagnetism and faunal constraints on global biogeography from 500 Ma (the late Cambrian) to 400 Ma (the early Devonian); this work is now in press in the Journal of the Geological Society, (iii) the Malopolska and Lysogory terranes, which together make up the Holy Cross Mountains of Poland, and their continental affinities in the Lower Palaeozoic - in fact they are both an integral part of the main Baltica terrane, despite being south-east of the Trans-European Suture Zone today. (iv) systematic brachiopod studies in press and continuing on the Chu-Ili terrane, Kazakhstan (with Leonid Popov, Cardiff, and Igor Nikitin, Almaty). (v) continuing work on the Ordovician to Devonian stratigraphy of north-west Malaysia and adjacent southern Thailand (with Richard Fortey and Lee Chai Peng, Kuala Lumpur).

Elias, Bob (Canada) - I'm studying various aspects of corals and environmental change during the Ordovician radiation, mass extinction, and Early Silurian recovery. Research with Graham Young focuses on the diversity, paleoecology, community structure, and morphologic trends of coral faunas. A collaborative project is underway with Graham, Godfrey Nowlan, Dave Rudkin and

others on a spectacular Late Ordovician-Early Silurian archipelago with rocky shorelines, exposed in the Churchill area of northern Manitoba. Adam Melzak (Ph.D. student) is working on the Late Ordovician to earliest Silurian rugose corals of Anticosti Island, Quebec. M.Sc. and Ph.D. projects are available (please see http://www.umanitoba.ca/geoscience/faculty/elias/elias.html).

David Gelsthorpe (UK) - I am currently in the writing up stage of my Ph.D. entitled "Microplankton changes through a mass extinction: the early Silurian Ireviken Event", working with Dick Aldridge, Lennart Jeppsson, Ken Dorning, Stewart Molyneux and Alain Le Hérissé. I have presented my Gotland research at Pal Ass in Copenhagen and have been asked to present at the IPC in Sydney in June 2002. My first paper (Testing of palynological processing techniques: an example using Silurian palynomorphs from Gotland) has been accepted for the next issue of the journal Micropalaeontology. I intend to publish the rest of my thesis later this year.

Yngve Grahn (Brazil) - At present I am involved in Silurian and Devonian studies of the Parnaíba and Solimões basins, northern Brazil. A special study of the Silurian (Tianguá Formation) and lower Devonian is on the way from the Parnaíba Basin. Questionable Silurian beds are also known from the lower Jutaí Formation in the Solimões Basin, and this study will be included in a monograph of the Silurian-Devonian, integrated chitinozoan-miospore biozonation in that basin. A paper dealing with late Silurian chitinozoans from south-central Bolivia (Kirusillas and lower Tarabuco formations) will hopefully be published later this year.

Charles Holland (Ireland) – I am continuing to work on nautiloid cephalopods. A paper on the cephalopods from the Lower Hill Farm borehole in the Type Wenlock is now in press. I am nearing the end of work on a large amount of material from Anticosti.

Lennart Jeppsson (Sweden) continues studying the details of Silurian events. It is now evident that these events are the key to a more detailed and more precise Silurian stratigraphy. Not only the conodonts but many other major clades, sediments, and stable isotopes were affected by these events. Two manuscripts together with Mikael Calner about the Mulde Event are being refereed. Lots of data for the Lau Event has been assembled in co-operation with several colleagues. A paper about bias in collecting is in an advanced stage.

Jisuo Jin (Canada) is studying the community structures of the reef-dwelling brachiopods of the Lower Silurian Attawapiskat Formation, Hudson Bay Lowlands. Christopher Stott (PhD student) and Jisuo Jin are examining the faunal turnover across the Ordovician-Silurian boundary, Manitoulin Island and the Bruce Peninsula, Ontario. Paul Glasser (MSc student) and Jisuo Jin are conducting a biometric analysis of the Early Silurian *Pentamerus-Pentameroides* evolutionary lineage.

Mark Kleffner (USA) - I am currently finally completing a the manuscript on the latest revision of a conodont-, graptolite-, and chitinozoa-based Silurian chronostratigraphy (with James Barrick). I would like to thank everyone who has been kind enough to send me reprints of their recent work, even unpublished or soon-to-be-published information, on conodonts, graptolites, and chitinozoa. Your generosity has made it possible for me to greatly increase range-data on those groups in the Silurian Composite and to accomplish the major revision of the Silurian chronostratigraphy based on those data. The figures are all completed, now all I have to do is finish the text. For any of you who have seen the previous versions of the conodont- and graptolite-based Silurian chronostratigraphy I published (with the extremely lengthy Pridoli and very short Wenlock), you might be surprised at the calibration of the newly revised Silurian

chronostratigraphy. The Pridoli has a duration of 2.8 my, the Ludlow a duration of 3.7 my and the Wenlock a duration of 4.6 my, which is much more in line with the spacing of those Series shown in the standard left-hand column developed by the Subcommission on Silurian Stratigraphy and published in Silurian Times #3 in 1995. The other project occupying my current research time is a study of the Lower Silurian strata of Ohio and Kentucky.

Tatiana Koren (Russia) - I am completing my joint work with Anna Sujarkova on systematic description (18 species), biozonation and phylogenetic implications the Ludlow cucullo- and neocucullograptids from the South Tien Shan'. The work with Otto Walliser on the graptolite-conodont zonal ties from the Upper Silurian sections of Central Asia is in progress. Currently I investigate the taxonomy and stratigraphic ranges of the Ordovician-Silurian boundary diplograptids (the *persculptus* to *acuminatus* Zones) from Röstånga-1 and Lønstorp-1 cores in Scania and Billegrav-1 core in Bornholm. Most of my activity during the first part of the year is dedicated to the struggle with the Ministry of Natural Resources, Moscow, for money for paleontological and stratigraphic investigations in our Institute and in the other organizations within Russia. Since the end of the last year the drastic changes took place with branch geology within the country, and our Institute has no financial support starting from January.

Phillippe Legrand (France) - I am working on the Lower Silurian graptolites in Algerian Sahara and the Palaeogeography of Silurian in Algerian Sahara

Alain Le Hérissé (France) - The main research is focused on the period of the Upper Ordovician to Upper Devonian, with an interest to establish the precise relationship of paleoenvironmental and gloabal paleoclimatic conditions to radiations and extinctions of acritarchs in the primitive oceans. I am engaged on the study of impact of Ordovician glaciation on phytoplanctonic associations in Baltica and North Africa (collaboration with A. Bourahroux, F. Paris and A. Munnecke), on the interpretation of phytoplanktonic signal in relation to isotope excursions, facies and climatic changes in the Silurian of Gotland, Sweden, detailed analysis on acritarch assemblages form the Silurian of Saudi Arabia, Brazil and late Silurian of Libya (paper in press in RPP). I am also working on the applicability of acritarchs (mainly resting cysts of planktonic producers) to the paleogeographical reconstructions, and on upper Devonian acritarchs and other microalgae from the Amazon Basin Brazil, with proposition of a zonation scheme, with measurement of the influence of Frasnian anoxic episodes on the phytoplanctonic associations, and with some precision on the evolution of assemblages before the Carboniferous. (in collaboration with J.H.G. Melo, J. Rodriguez from Petrobras).

Alfred Lenz (Canada) - My main research focus continues to center around Wenlock and younger graptolites of Arctic Canada. Currently, and in collaboration with A. Kozlowska-Dawidziuk (Poland), a large project involving the study of both flattened, and isolated and uncompressed Ludlow and Pridoli graptolites is well underway. Further collecting for this project will continue in the summer of 2002, during which time samples will be taken for palynology (analysis by M. Masiak, Poland), radiolarians (analysis by P. Noble, USA), and geochemistry (analysis by S. Poulson, USA). A second and ongoing project involves a very detailed study of the stratigraphic ranges and diversity changes of graptolites, radiolarians, and palynomorphs, integrated with changes in geochemistry through the lower-upper Homerian boundary (the "lundgreni extinction event" boundary) to the upper Homerian-Ludlow boundary interval. The above four researchers are also involved in this project. Further detailed sampling of this interval will be carried out in the summer of 2002. Smaller projects include the study of a small, but biostratigraphically important Early Silurian graptolite fauna in Argentina in collaboration with A. Cuerda and S. Peralta (Argentina), and Upper Silurian and Lower Devonian gastropods from northern Yukon,

Canada, in collaboration with R. Blodgett (USA) and J. Fryda (Czech Republic). A study of all Silurian retiolitids in relation to the revision of the graptolite Treatise is slowly taking form. The study is being carried out primarily by A. Kozlowska-Dawidziuk, D. Bates (UK), M. Melchin (Canada) and me. Sherrill Senior (University of Western Ontario, Canada) continues her PhD studies on the taxonomy, biostratigraphy and phylogeny of the graptolite *Cyrtograptus* from Arctic Canada.

David Loydell (UK) - Last year saw the completion of the integrated biostratigraphical work on the Aizpute-41 (Latvia) core with Peep Männik and Viiu Nestor. This has been submitted for publication. Foot-and-mouth disease prevented fieldwork being undertaken in the UK, so work on the trace fossil project mentioned in last year's Silurian Times has been postponed to the summer of 2002. Other projects completed in 2001 included the dating of the Thornton (Illinois) *Konservat-Lagerstätte* (with Gary Mullins, Peep Männik, Joanne Kluessendorf and Don Mikulic - in press) and a follow-up to the work on the Banwy River section, an integrated biostratigraphical study of the Telychian-lower Sheinwoodian of Buttington Brick Pit (with Gary Mullins). Both Kate Saunders (Silurian dendroids, especially from Illinois and Waukesha - jointly supervised by Joanne Kluessendorf and Don Mikulic) and Judi Thorogood (Silurian bentonites - jointly supervised by Nick Pearce and Dick Cave) successfully defended their Ph.D.s. Preparation of publications from their theses will take place this summer. Andrew Mallett (jointly supervised by Mark Williams and Maxine Axhurst) is continuing his work on the Hawick Group graptolites of Scotland - his room is filling up with boxes of specimens. Anthony Butcher is making good progress with his work on Silurian chitinozoan biostratigraphy in Illinois. Current research is focusing on Llandovery graptolites from Sweden (writing up work undertaken jointly with Jörg Maletz), Estonia and Latvia (taxonomic work on species identified during work with Viiu Nestor and Peep Männik) and Spain (joint work with Petr Štorch and Juan Carlos Gutiérrez-Marco).

Jorg Maletz (USA) - I am still working mostly on Ordovician graptolite faunas, but have shifted more and more towards the Silurian, especially as the Silurian is more widely distributed in Germany and there was some interest from the German Subkommission on Silurian Stratigraphy. I am staying in Buffalo, N.Y., working with Chuck Mitchell for the next two years and will be focussing more on the taxonomy of Ordovician Dichograptacea. My work on Silurian graptolites includes tracing and re-identifying the huge collections of material described by German workers in the last century, most of which is actually preserved in German museum collections (collections of Hundt, Eisel, Geinitz, Hemmann, Manck, Muench etc.). I am also working on isolated material of Llandovery graptolites from the *Coronograptus cyphus* to *Streptograptus sartorius* biozones of Dalarna (Sweden). I spent 6 month last year in Portsmouth working with David Loydell, especially concentrating on structural details and evolution in a number of *Streptograptus* species found in the Osmundsberget and Kallholn sections. A paper on isolated faunas from the *Lituigraptus* (?) *convolutus* biozone is in progress.

Andy Mallett (UK) - Work continues on my project to erect a high-resolution graptolite biostratigraphy for the Hawick Group, Southern Uplands, Scotland. An investigation will also be undertaken into the possible use of chitinozoan biostratigraphy within the area.

Peep Männik (Estonia) - I am actively working on the evolution, ecology and taxonomy of Ordovician and Silurian conodonts from the Baltic, Arctic regions, and Siberia, and on conodont-based, high-resolution stratigraphy. Several joint studies (composition, distribution and evolution of Silurian conodont faunas - with L. Jeppsson from Lund University; "Collaborative research: comparing Upper Ordovician-Lower Silurian carbonate platform in Estonia and Great Basin: a test of the synchrony of sequences and faunal changes" - with Mark T. Harris from theWisconsin-

Milwaukee University and Peter M. Sheehan from the Milwaukee Public Museum; evolution and high-resolution stratigraphy of the Early Palaeozoic sedimentary basins in northern Baltica and Siberia palaeocontinents - with colleagues from Lund, Vilnius, StPetersburg, Syktyvkar, Ukhta and Novosibirsk; taxonomy, distribution and evolution of Walliserodus - with James E. Barrick from Texas Tech University; etc.) are going on.

Tiiu Marss (Estonia) - My work on the Russian and Canadian agnathans and fishes is continuing. The short version on the Canadian thelodonts and possible chondrichthyans is out, and the monograph itself is nearly ready (we will submit it this year). Three papers on thelodonts from Severnaya Zemlya and on anaspids of northern hemisphere will be published soon.

Michael Melchin (Canada) - I am continuing to focus my research efforts, with a number of students and colleagues, on the biostratigraphy, phylogeny, and biodiversity changes of Late Ordovician and Early Silurian graptolites. I am currently working mainly on Hirnantian and Llandovery faunas from Arctic Canada, China (with Chen Xu, Fan Juanxuan, and Chuck Mitchell), and Scotland (with Henry Williams and Fan Juanxuan). Jennifer Russel recently completed her PhD thesis on the taphonomy of Llandovery graptolites from Arctic Canada. Eugene MacDonald is nearing completion of his PhD thesis on Late Ordovican and Early Silurian Radiolaria from Arctic Canada. Work also continues on co-ordination and writing of the next volume of the graptolite Treatise.

Tatiana Modzalevskaya (Russia) - I'm actively working on preparing of Atlas for publication with Silurian and Early Devonian brachiopods of Severnaya Zemlya Archipelagos. The Silurian athyrisinins from Russia were revised and will be published with co-authors Rong Jia-yu, Fernando Alvarez and Zhang Jau in the paper: "Revision of the Athyrisininae, Siluro-Devonian brachiopods from China and Russia".

Gary Mullins (UK) - I continue to work on a joint project with Dick Aldridge, David Siveter, Ken Dorning, Stewart Molyneux, Alain Le Hérissé, Ruth Richards, Paul Hill, Paul Swire and Jane Washington-Evans on the acritarchs of the Wenlock and Ludlow Series of the respective type areas. A Monograph of the Palaeontographical Society on the acritarchs of the lower Gorstian Stage has recently been published, and a paper on the acritarchs of the lower Ludfordian Stage has been accepted for the journal Palaeontology. We also continue to work on projects relating the temporal changes in the abundance, species composition and diversity of the acritarchs with the proposed large scale palaeoenvironmental fluctuations. I am also examining the chitinozoans recovered by John Mabillard and Dick Aldridge from the stratotype section for the base of the Wenlock Series (Hughley Brook, Shropshire). The diversity is higher than described in their paper (Mabillard & Aldridge 1981) and several biostratigraphically diagnostic taxa have been observed which should allow more accurate correlation with this section.

Godfrey Nowlan (Canada) - I am working jointly with Bob Elias (University of Manitoba), Dave Rudkin (Royal Ontario Museum), Graham Young (Manitoba Museum of Man and Nature) on the Ordovician - Silurian rock shoreline near Churchill, Manitoba. Field work is planned for 2002. I am also working on northeastern Ellesmere Island on conodont faunas from Cambrian to Devonian age (some Silurian) - final write-up phase of a large field study. Most other work at the moment is on Cambrian and Ordovician material.

Gladys Ortega (Argentina) - I am working with Guillermo Albanesi on Silurian graptolite and conodont faunas (taxonomy, biostratigraphy, biofacies) from a number of sections of the La Chilca and Los Espejos formations (Late Ordovician - Late Silurian), Precordillera, western

Argentina. I continue working with Silurian graptolite faunas from the Subandean Ranges of Jujuy Province, NW Argentina.

José Manuel Piçarra (Portugal) - Lower Paleozoic stratigraphy of South Portugal (Ossa Morena Zone). Silurian graptolites from Portugal (with cooperation of J.C. Gutiérrez-Marco) and Armorican Massif (Portuguese-French cooperation, project "O Devónico em Portugal e no Maciço Armoricano: estratigrafia de alta resolução, bioestratigrafia e paleogeografia. Implicações na parte sudoeste europeia da Cadeia Varisca", with R. Gourvennec, J. Le Menn, M. Robardet, T. Oliveira and Z. Pereira). 410 and 421 IGCP projects.

Rong Jia-yu (China) is continuing to work on the Silurian brachiopod taxonomy, community, and biogeography, chiefly from China. He is also working on mass extinctions and subsequent biotic recovery in South China. He works together with Xu Hankui, Zhan Renbin and others on the diversity changes of brachiopods through Rhuddanian to Pridoli based on the data derived from China.

Claudia Viviana Rubinstein (Argentina) - I continue working on Lower Paleozoic palynomorphs (acritarchs, cryptospores, spores and chitinozoans) from Argentina. Studies focused on northwestern Argentina include: 1) the Ordovician-Silurian boundary of the Puna. This involves a manuscript I have recently completed together with N. E. Vaccari (CONICET- UNiv. N. de Jujuy) ; 2) the Silurian of the Eastern Cordillera; 3) a continuous and palynologically-rich section comprising the Ordovician-Silurian transition and the Silurian from the Subandean Ranges. The aim of this research in cooperation with R. Astini (CONICET- Univ. N. de Cordoba) is to precise the extension and effects of the Hirnatian glaciation and the Ordovician- Silurian boundary in northwestern Argentina.

Lawrence Sherwin (Australia) continued with mapping of Silurian (not always very fossiliferous) units in the Goulburn district of New South Wales. He co-produced a paper on late Llandovery trilobites from the Cotton Formation, near Forbes, with Greg Edgecombe. This describes three new species, Odontopleura (Sinespinaspis) markhami, Aulacopleura pogsoni and Raphiophorus sandfordi.

Andrew Simpson (Australia) - Work continues with Silurian colleagues Ruth Mawson & John Talent (MUCEP), Lennart Jeppsson (Lund), Anita Andrew & Dave Whitford (CSIRO) on documenting the lithological, conodont biostratigraphy and isotopic data through the Late Silurian Lau Event in the Jack Formation North Queensland. Initial comparisons with the Gotland sequence are revealing some intriguing similarities. Some data will be presented at the IPC2002 meeting in Sydney and the Goldschmidt conference later this year. A brief paper describing a new subspecies of Ozarkodina from the Late Silurian and its correlative value has been submitted. The acid baths at Macquarie continue to yield a corpus of conodont data from sequences throughout eastern Australia for a variety of student projects.

Carl W. Stock (USA) - Heldur Nestor and I continue our investigation of the Llandovery recovery of stromatoporoids following the end-Ordovician mass extinction. In particular, we are now looking at the stromatoporoids from the Aeronian-age Hendricks Formation of northern Michigan. In addition we are collaborating with Paul Copper in a study of the Llandovery-age stromatoporoids from Anticosti Island, Quebec. Several new genera are present in the Anticosti Island Llandovery, and at least one new genus is present in Michigan.

Des Strusz (Australia) has been concentrating on the brachiopods of the long-known Silurian succession at Yass, northwest of Canberra. In the first report, due out in May 2002, the orthides and protorthides are described (for the first time!). This report also has a lengthy discussion on correlation of the various stratigraphic units in the light of conodont and graptolite work done over the last decade or so, and an account (based in part on Link's largely unpublished thesis) of the changes in sedimentation, communities and palaeogeography through the sequence. A second paper, revising (and adding to) the strophomenatan species has been submitted to Alcheringa. Work has now started on the rather limited pentameride fauna. There was also more general discussion of Silurian brachiopod palaeobiogeography in a review paper presented to a meeting on Australian palaeobiogeography in Wollongong in 1997 and published in 2000. Ongoing, but at a rather slow pace, is collaboration with Tim Munson (now in Darwin, with the Northern Territory Geological Survey) on Silurian coral faunas. One review paper has been published, with John Pickett, on tabulate (and chaetetid) biostratigraphy, and work has started on a revision of Etheridge's tryplasmatid species. A study of the fauna from the Micalong Limestone, west of Canberra, was started before Tim left for Darwin, but is temporarily in abeyance.

Susan Turner (Australia) - Analysis of records of Cambrian and Ordovician vertebrate, so-called vertebrate and vertebrate-like remains has led also to consideration by Alain Blieck (UST Lille, Godfrey Nowlan (GSC Calgary) and myself of the earliest Silurian record also (see refs below). I am at work on Early and late Silurian microvertebrate assemblages from arctic Canada - material from Devon Island with Chris Barnes (UVic), and one from Somerset Island (with Dr Jim Savelle, McGill). With Carole Burrow I began working on microvertebrate material from the Helderberg Group of New York State collected by Dr Jim Ebert (Earth Sciences Department, SUNY College at Oneonta); acanthodian remains support a Pridoli date.

Jo Vergoossen (Netherlands) - Main present research themes are: Late Silurian fish faunas (microvertebrates) from the Öved Sandstone Formation, Scania, southern Sweden; Late Silurian fish faunas (microvertebrates) from Baltic-derived erratics from the Netherlands; microvertebrates from Ludfordian (*Thelodus sculptilis* Zone) fish/conodont faunas from (Baltic-derived) algal (*Sphaerocodium*) limestones; Late Silurian (inter)regional microvertebrate correlation within the Baltic area; Late Silurian fish faunas (microvertebrates) from the Oslo basin, Norway; Late Silurian - Early Devonian fish faunas (microvertebrates) from the UK; Revision of the late Silurian poracanthodid acanthodians (microvertebrates) from the Baltic region; Late Silurian *Nostolepis* taxa from Laurussia. Other research themes are: Late Silurian fish faunas (microvertebrates) from eastern Canada (Nova Scotia); Late Silurian - Early Devonian microvertebrate correlation within Laurussia.

Jacques Verniers and students (BELGIUM) (Lab. Palaeontology, Ghent University) - Much attention was paid to Ordovician and only little on the Silurian this year. Thijs Vandenbroucke finished his preliminary study of Chitinozoans of the UpperOrdovician and lower Silurian of the Girvan area, Schotland (Vandenbrouche et al. in press). can Jacques Verniers and co-workers could finish the revision of all existing formal and informal formations and members of the Lower Palaeozoic of Belgium. The Chitinozoan study on samples from seven Silurian formations of the Brabant Massif (Ronquières and the Monstreux areas) is in press. Within the PACE network and EUROPROBE we synthesised the knowledge on the eastern part of Avalonia and in a part to the east coined far-Eastern Avalonia (between Belgium and Ruegen-Pomerania). It contains also a model for the Lower Palaeozoic evolution and collision history of these two microcontinents (Verniers et al. In press). We will continue on the publications on Chitinozoa and lithostratigraphy of the Silurian and Ordovician outcrop areas or boreholes of the Brabant Massif, Condroz ridge, Romania, etc.

Viive Viira (Estonia) - Work continues on late Wenlock and Ludlow conodonts and biofacies from northern East Baltic.

Graham Young (Canada) - I'm working on various aspects of Paleozoic paleoecology, and on coral diversity and distribution before and after the Late Ordovician extinction event. Collaborations with Bob Elias examine diversity, community structure, and morphology of Late Ordovician and Early Silurian coral faunas. A large field project with Bob, Dave Rudkin, Godfrey Nowlan, and others assesses a paleoenvironments around a unique Late Ordovician-Early Silurian archipelago, in the Churchill area of northern Manitoba. Stephen Kershaw (Brunel University, England) and I are completing a manuscript on growth banding in Paleozoic corals and stromatoporoids, comparing Ordovician material from Manitoba with Silurian fossils from Gotland.

RECENT PUBLICATIONS OF SILURIAN INTEREST

Aldridge, R.J, Armstrong, H.A., Barrick, J. E., Jeppsson, L. &. Männik,P. 1998: Conodont extinctions and diversifications. Geological Society of America Abstracts with Program, North-Central Section, p.1.

Alvarez, F. and T.L. Modzalevskaya. 2001. Trends in athyridids diversity dynamics. In C.H.C. Brunton, L.R.M. Cocks and S.L.Long (eds.) Brachiopods. Past and Present. The systematics Association Special Volume Series 63. Pp. 210-223.

Antoshkina A. 2001. Ecology of Lower Devonian reefs in the Western Urals, Russia - Abstracts of 15th International Senckenberg Conference "Mid-Palaeozoic Bio- and Geodynamics: the North Gondwana - Laurussia intercalaction" May 11-21, 2001. Frankfurt am Main, 2001. P. 4.

Antoshkina A.I. 2001. Middle Paleozoic microbial-metazoan reef assemblages of the Western Urals. Proceedings of the II International Symposium "Evolution of Life on the Earth', November 12-15, 2001 Tomsk /Ed, V.M.Podobina. - Tomsk: NTL, P. 161-153.

Antoshkina A, Yurieva Z. 2001. Sedimentological events on the Silurian-Devonian boundary in the Timan-northern Ural region, Russia. - Abstracts of 15th International Senckenberg Conference "Mid-Palaeozoic Bio- and Geodynamics: the North Gondwana - Laurussia intercalaction" May 11-21, 2001. Frankfurt am Main, 2001. P. 5.

Armstrong, H.A., Pearson, D.G. and Greselin, M. 2001. Thermal effects on rare earth element and strontium isotope chemistry in single conodont elements. Geochimica Cosmochimica Acta 65, 435-441.

Armstrong, H. A. & Owen, A. W. 2001 Terrane evolution of the paratectonic Caledonides of northern Britain. J. Geological Society, London, 157, 475-486

Armstrong, H. A. & Owen, A. W. 2002. Euconodont diversity changes in a cooling and closing Iapetus Ocean. In Crame , J. A. & Owen A. W. (eds) Palaeobiolgeography and Biodiversity Change: a comparison of the Ordovician and Mesozoic-Cenozoic radiations. Geological Society, Special Publications, 194.

Barnes, C.R. 2001. Patterns of eustasy, paleoceanography and conodont biotic change associated with the terminal Ordovician glaciation. Geological Society of America, Annual Meeting, Boston. Program with Abstracts.

Barnes, C. R. 2001. The nature of the Early Paleozoic world. Earth System Processes Conference. Joint meeting of the Geological Society of America and the Geological Society of London, Edinburgh, June 2001. Program with Abstracts.

Barnes, C.R. 2002. Controls on the evolution of Early Paleozoic life. Joint Annual Meeting of the Geological Association of Canada and the Mineralogical Association of Canada, Saskatoon, Program with Abstracts.

Barnes, C. R. and Pyle, L. J. 2001. Lower Ordovician-Lower Devonian stratigraphic framework along a Macdonald Platform to Ospika Embayment transect, Trutch, Halfway River and Ware map areas (94G, B, F), northeastern British Columbia. SNORCLE/Canadian Tectonics Workshop, Victoria, February, 2001. Program with Abstracts, p. 204-207.

Barnes, C. R., Zhang, S., Ji, Z., Johnston, D. I., Pohler, S, M. L., and Sullivan, C. 2001. Conodont evolution and community patterns and the refinement of sealevel curves for the Lower Paleozoic Laurentian margin of Iapetus. Geol. Assoc. Can and Min. Assoc. Can. Joint. Ann. Mtg., St. John's, Program with Abstracts.

Batchelor R A & Evans J (2000) Use of strontium isotope ratios and Rare Earth Elements in apatite microphenocrysts for characterisation and correlation of Silurian metabentonites: a Scandinavian case study. Norsk Geologisk Tidsskrift 80, 3-8.

Bergström, S.M., Finney, S.C., Chen Xu, Palsson, C., Wang Zhi-hao, and Grahn, Y. 2000. A proposed global boundary stratotype for the base of the Upper Series of the Ordovician System: The Fagelsang section, Scania, southern Sweden. *Episodes* 23(2):102-109.

Blieck, A. & Karatajute-Talimaa, V.N. (in press / 2002).- Upper Silurian and Devonian heterostracan pteraspidomorphs (Vertebrata) from Severnaya Zemlya (Russia): a preliminary report with biogeographical and biostratigraphical implications.- Geodiversitas, 24 (3), Paris (submitted, accepted). [with a general review of Upper Silurian-Devonian vertebrate occurrences in Severnaya Zemlya].

Blieck, A. & Turner, S. 2000.- IGCP 328: Palaeozoic Microvertebrates final scientific report - Introduction.- In: Blieck, A. & Turner, S. (eds.), Palaeozoic Vertebrate Biochronology and Global Marine/Non-Marine Correlation - Final Report of IGCP 328 (1991-1996). Cour. Forsch.-Inst. Senckenberg, 223: 1-67, 4 fig., 2 tabl.; Frankfurt a.M. [with a synthetic vertebrate scale for the Silurian and the Devonian for both the ORS continent and eastern Gondwana].

Blieck, A. & Turner S. 2001. Cambrian-Ordovician vertebrates. In : Droser, M.L. (convenor) IGCP 410 : The Great Ordovician Biodiversification Event (Riverside, California, June 22-24, 2001), PaleoBios, 21 (2) : 1-2 (abstract), Univ. California, Berkeley.

Blieck, A. & Turner S. (in press, 2002). Global Ordovician vertebrate biogeography. IPC Conference Sydney July 6-10, abstracts

Blieck, A. & Turner S. (in press, 2002). Global Ordovician vertebrate biogeography. Th. Servais, J.J. Alvaro and A. Blieck eds. Palaeogeography, Palaeoclimatology, Palaeoecology.

Blieck, A., Turner S. & Young G. C. 2001. Cambrian-Ordovician vertebrate biogeography. In : Alvaro, J.J. & Servais, T. (org.) "Early Palaeozoic Palaeogeographies and Biogeographies of W Europe and N Africa" (Univ. Sci. Techn. Lille, Villeneuve d'Ascq, Sept. 24-26, 2001), poster, Abstracts volume, p. 10.

Blodgett, R.B., Fryda, J., and Lenz, A.C. 2001. *Semitubina yukonensis* n. sp., first occurrence of this biogeographically distinctive old world realm gastropod genus in the Lower Devonian of the western hemisphere. Journal of Paleontology, 75:466-470.

Blom H., Märss T. and Miller G. 2002. Silurian and earliest Devonian birkeniid anaspids from the Northern Hemisphere. Transactions of the Royal Society of Edinburgh: Earth Sciences, 92 (3).

Bogolepova, O.K., Gubanov, A.P. & D.K. Loydell 2000. New data on the Silurian of Severnaya Zemlya, Russian Arctic. GFF, Vol. 122 (4), pp. 385-388.

Bogolepova, O.K., Gubanov, A.P. & E.G. Raevskaya 2001. The Cambrian of the Severnaya Zemlya Archipelago, Russia. Newsletters on Stratigraphy. Vol. 39(1), pp. 73-91

Boucot, A.J., Tong-Dzuy Thanh, Rong Jia-yu and Fang Zong-jie. 2001 Late Silurian marine shelly fauna of central and northern Vietnam: Geobios, 34, 315-338.

Boucot, A.J., 2001 A critique of Phanerozoic climatic models involving changes in the CO2 content of the atmosphere. Earth-Science Reviews, 56, issues 1-4, pp. 1-159.

Boucot, A.J., Chen Xu and C.R. Scotese 2001 changing positions of Phanerozoic climatic belts and accompanying paleogeographic changes. in Evolutsiya zhizni na zemle, Materiali II Mezhdunarodnogo Simposyma, Tomsk Gosudarstnogo Universitet, p. 11-12.

Boucot, A.J., Chen Xu and C.R. Scotese 2001 Changing positions of Phanerozoic climatic belts and accompanying paleogeographic changes. International Symposium on exploring the history of life on the Earth, Paleontology in China during the last 15 years, National Natural Science Foundation of China, p. 53-57.

Boucot, A.J., A.J. Rowell, P.R. Racheboeuf, E. Pereira, J.H.G. de Melo, L.P. de Siqueira 2001 Position of the Malvinokaffric Realm's northern boundary (Early Devonian) based on newly discovered brachiopods from the Parecis Basin: Journal of the Czech Geological Society, 46(1-4) 109-120.

Boucot, A.J., J.N. Theron 2001 First *Rhipidothyris* (Brachiopoda) from Southern Africa: Biostratigraphic, paleoecological, biogeographical significance: Journal of the Czech Geological Society, 46(1-4) 155-160.

Boucot, A.J., R.B. Blodgett 2001 Silurian-Devonian biogeography. In C.H.C. Brunton, L.R.M. Cocks and S.L. Long, eds., Brachiopods past and present, Taylor and Francis, London and New York, pp. 335-344.

Boucot, A.J., Rong Jia-yu, Chen Xu, C.R. Scotese (in press) Pre-Hirnantian Ashgill climatically anomalous warm event in the Mediterranean region: Lethaia

Boucot, A.J., R.B. Blodgett (in press) Oldest, smallest *Newberria* (Brachiopoda) from the Eifelian (early Middle Devonian) of west-central Alaska. Neues Jahrbuch fur Geology und Palaontologie

Burrow, C.J., 2001: Late Silurian to Middle Devonian acanthodians of eastern Australia. Ph D thesis, University of Queensland, 226 pp. incl. Site appendix, bibliography & 28 figs. + 12 tables + 34 plates.

Chen Xu, Ni Yu-nan, Mitchell, C.E., Qiao Xing-dong and Zhan Shi-gao 2000. Graptolites from the Qilang and Yingan formations (Caradoc, Ordovician) of Kalpin, Western Tarim, Xinjiang, China. Journal of Paleontology, 74(2):282-300. (in English).

Chen Xu, Rong Jia-yu, Fan Jun-xuan, Zhan Ren-bin, Zhang Yuan-dong, Li Rong-yu, Wang Yi, Mitchell, C.E., and Harper, D.A.T. 2000. A Global Correlation of Biozones Across the Ordovician-Silurian Boundary. Acta Palaeontologica Sinica, 39(1):100-114. (in Chinese with English abstract).

Chen Xu, Rong Jia-yu, Zhang Yuan-dong and Fan Jun-xuan 2000. A Commentary on Ordovician Chronostratigraphy. Journal of Stratigraphy, 24(1):18-26. (in Chinese with English abstract).

Chen Xu, Rong Jia-yu, Fan Jun-xuan, Zhan Ren-bin, Zhang Yuan-dong, Wang Zhi-hao, Wang Zong-zhe, Li Rong-yu, Wang Yi, Mitchell, C.E., and Harper, D.A.T. 2000. Biostratigraphy of the Hirnantian Substage in the Yangtze region. Journal of Stratigraphy, 24(3):169-175. (in Chinese with English abstract).

Chen Xu, Rong Jia-yu, C. E. Mitchell, D. A. T. Harper, Fan Jun-xuan, Zhan Ren-bin, Zhang Yuan-dong, Li Rong-yu and Wang Yi, 2000. Late Ordovician to earliest Silurian graptolite and brachiopod biozonation from the Yangtze region, South Chian with a global correlation. Geological Magazine, 137(6): 000-000.

Chen Xu, Rong Jia-yu, Zhou Zhi-yi, Zhang Yuan-dong, Zhan Ren-bin, Liu Jian-bo, and Fan Jun-xuan 2001. The Central Guizhou and Yichang Uplifts, Upper Yangtze region, between Ordovician and Silurian. Chinese Science Bulletin, 46(12): 1052-1056. (in Chinese); 46(18): 1580-1584 (in English)

Chen Xu, Ruan Yi-ping and Boucot, A.J. (eds.) Paleozoic Climatological Evolution of China. Science Press, Beijing, 1-325. (in Chinese).

Chen Xu, Wang Hai-feng and C. H. Holland (eds.) 2000. Geological History of the Nanjing Hills - A Guide for Overseas Geologists. 228pp. Laboratory of Palaeobiology and Stratigraphy, Nanjing Institute of Geology and Palaeontology and Centre for Ecostratigraphy and Palaeobiology, School of Earth Scienecs, Macquarie University, Australia. (in English).

Chen Xu, Zhang Yuan-dong and Mitchell, C.E. 2001. Early Darriwilian graptolite from central and eastern China. Alcheringa, 25:191-210.

Chen Xu, Zhou Zhi-yi, Rong Jia-yu and Li Jun 2000. Ordovician. In Nanjing Institute of Geology and Palaeontology, Academia Sinica (ed.), Stratigraphical Studies in China (1979-1999), 39-58. (in Chinese).

Chen Xu, Zhou Zhi-yi, Rong Jia-yu and Li Jun 2001. Ordovician series and stages in Chinese stratigraphy: steps toward a global usage. Alcheringa, 25:131-141.

Cocherie, A., Chantraine, J., Fanning, C.M., Dabard, M.P., Paris, F., Le Hérissé, A. and Egal, E., 2001. Datation U/Pb : âge Briovérien de la série d'Erquy (Massif Armoricain, France). C.R. Acad. Sci. Paris. Sciences de la Terre et des Planètes, 333 (2001) : 427-434.

Cocks, L.R.M. (2001). Ordovician and Silurian global geography. Journal of the Geological Society, London, 158, 197-210.

Cocks, L.R.M. (2001). Palaeobiogeography and biostratigraphy. In Brunton, C.H.C., Cocks, L.R.M. & Long, S.L. (eds), Brachiopods past and present. Taylor & Francis, London, 297-298.

Cocks, L.R.M., McKerrow, W.S. & Verniers, J. (accepted September 2001). Avalonia. (Markes Johnson editor; Proceedings of the James Hall Symposium, Rochester, NY, USA, august 1996). Edgecombe, G.D. & Sherwin, L., 2001. Early Silurian (Llandovery) trilobites from the Cotton Formation, near Forbes, New South Wales. Alcheringa 25, 87-105, 7 figs.

Davis, R.A., Fraaye, R.H.B. & Holland, C.H. 2001: Trilobites within nautiloid cephalopods. Lethaia, 34: 37-45

Elias, R.J. & G.A. Young. 2001. Rugose coral morphology during a time of crisis: the latest Ordovician to earliest Silurian Edgewood Province in Laurentia. In: Ezaki, Y., K. Mori, T. Sugiyama & J. E. Sorauf, eds., Proceedings of the 8th International Symposium on Fossil Cnidaria and Porifera, September 12-16, 1999, Sendai, Japan. Tohoku University Museum, Bulletin No. 1: 34-40.

Eriksson, M., Jeppsson, L., Bergman, C.F., & Hints, O. 2000: Paranomenclature and the rules of Zoological nomenclature - with examples from fossil polychaete jaws (scolecodonts). Micropaleontology 46,186-188.

Frýda, Jiri, Blodgett Robert B., and Lenz, Alfred C. 2002. New early Devonian gastropods from the families Crassimarginatidae (new family) and Scoliostomatidae (new family), Royal Creek area, Yukon Territory, Canada. Journal of Paleontology, 76: 246-255.

Grahn, Y. & Gutiérrez, P.R. 2001: Silurian and Middle Devonian Chitinozoa from the Zapla and Santa Bárbara Ranges, Tarija Basin, Northwest Argentina. Ameghiniana 37, 35-50.

Grahn, Y., Loboziak, S., & Melo, J.H.G. 2001: Integrated miospore chitinozoan biozonation of the Parnaíba Basin and its correlation with Petrobras (Müller 1962) Silurian - early Carboniferous palynozones. Correlação de seqüèncias Paleozóicas Sul-Americanas (Melo, J.H.G. & Terra, G.J.S., eds.) Ciència - Técnica - Petróleo. Seção: Exploração de Petróleo n° 20: 81-89.

Grahn, Y., Pereira, E. & Bergamaschi, S. 2000. Silurian and Lower Devonian chitinozoan biostratigraphy of the Paraná Basin in Brazil and Paraguay. Palynology 24, 143-172.

Harper, D.A.T., Bassett, M. G., Cocks, L. R. M., Copper, P., Holmer, L.E., Jin Jisuo, Popov, L.E., Rong Jia-yu and Sheehan, P.M., 2001. Ordovician brachiopod diversity. Paleobios, 21(2): 5-6. Museum of Paleontology, University of California, Berkeley.

Harper, D.A.T. and Rong Jia-yu, 2001. Palaeozoic brachiopod extinctions, survival and recovery: pattern within the rhynchonelliformeans. Geological Journal 36: 317-328.

Herbosch, A., Verniers, J., Debacker, T., Billiaert, B., De Schepper, S., Belmans, M. 2001. The Lower Palaeozoic stratigraphy and sedimentology of the Brabant Massif in the Dyle and Orneau valleys and of the Condroz Inlier at Fosses: an excursion guidebook. Pre-symposium excursion of the International Symposium on "Early Palaeozoic Palaeogeographies and Biogeographies of Western Europe and North Africa", Lille USTL, September 22-26, 2001, 77 p.

Hints O., Bergman C.F. and Märss T. Silurian jawed polychaetes from Cornwallis and Baillie-Hamilton islands, Canadian Arctic. In: Antoshkina A., Malysheva E. and Wilson M.V.H. (eds). Pan-Arctic Palaeozoic Tectonics, Evolution of Basins and Faunas. Syktyvkar, Russia, July 12-15, 2000. Ichthyolith Issues. Special Publications 6, p. 35-38.

Holland, C.H. 2000: A quartet of cephalopodologists. Geology Today, 16: 231-235.

Holland, C.H. 2000: Silurian cephalopods from Pentland Hills. Scottish Journal of Geology, 36: 177-186.

Holland, C.H. 2000. *Harrisoceras* and *Temperoceras* closely related cephalopod genera from the British Silurian. Bollettino della Paleontologica Italiana, 39: 117-122.

Holland, C.H. (ed.) 2001: The Geology of Ireland. Dunedin Academic Press, Edinburgh, 532pp.

Holland, C.H. 2001: Introduction, Cambrian of Leinster, Silurian. *In* The Geology of Ireland. Dunedin Academic Press, Edinburgh, 532pp.

Jeppsson, L. & Aldridge, R.J. 2000: Ludlow (late Silurian) oceanic episodes and events. Journal of the Geological Society (London.) 157, 1137-1148.

Jeppsson, L. & Aldridge, R.J. 2001: Discussion on Ludlow (late Silurian) oceanic episodes and events. Reply. Journal of the Geological Society (London.) 158, 731-732.

Jin, J. and Copper, P. 2000. Late Ordovician and Early Silurian pentamerid brachiopods from Anticosti Island, Québec. Palaeontographica Canadiana, n. 18, 140 pp..

Jin, J. 2001. Early Silurian stricklandiid brachiopod evolution in eastern North America. *In* C. H. C. Brunton, L. R. M. Cocks, and S. Long (eds.), Brachiopods past and present. Taylor & Francis, London, pp. 177-188.

Johnson, M. E., Rong Jia-yu, Wang Cheng-yuan and Wang Ping, 2001: Continental island from the Upper Silurian (Ludfordian Stage) of Inner Mongolia: Implications for eustasy and paleogeography. Geology, 29: 955-958.

Karatajute-Talimaa, V. and Märss, T. 2002. Upper Silurian thelodonts of Severnaya Zemlya Archipelago. Geodiversitas, 24 (2).

Kiipli T, Männik P, Batchelor R A, Kiipli E, Kallaste T & Perens H (2001). Correlation of Telychian (Silurian) altered volcanic ash beds in Estonia, Sweden and Norway. Norsk Geologisk Tidsskrift 81, 179 - 193.

Kleffner, M. A. 2001. Do "imitation" and "bent" Brassfield and diachronous Dayton indicate Ohio's Lower Silurian "layer-cake" stratigraphy is half-baked? [abs.] Ohio Journal of Science 101(1):A24.

Kleffner, M. A. 2002. Conodont events of the late Llandovery (Silurian) through earliest Devonian of the North American Midcontinent [abs.] The Geological Society of America Abstracts with Programs, 34(2):A101.

Kleffner, M. A., and Barrick, J. E. 2001. A conodont-, graptolite-, and chitinozoa-based Silurian (upper Llandovery-Pridoli) chronostratigraphy [abs.] The Geological Society of America Abstracts with Programs, 33(4):A20.

Kleffner, M. A., and Barrick, J. E. 2002. Newly revised and calibrated conodont-, graptolite-, and chitinozoa-based Silurian chronostratigraphy developed using the graphic correlation method [abs.] The Geological Society of America Abstracts with Programs, 34(2):A27.

Koren' T.N. 2002. Are the global biological and geological events synchronous? Abstracts of the XLVIII session of Pal. Soc. of Russia. St.-Petersburg, VSEGEI 2002, pp. 69-71.

Koren', T.N. and Melchin, M.J. 2000. Lowermost Silurian graptolites from the Kurama Range, eastern Uzbekistan. Journal of Paleontology, 74:1093-1113.

Kozlowska-Dawidziuk, A., Lenz, A.C. 2001. Evolutionary development in the Silurian Retiolitida (graptolites). Journal of the Czech Geological Survey, 46:227-238.

Kríž, J. 2000. Lower Palaeozoic, Upper Cretaceous and Quaternary of Bohemia, Excursion Guidebook. - Annual meting of the European Association for the Conservation of the Geological Heritage, Prague June 1st, 2000 - June 9th, 2000. - Czech Geological Survey, 1-41, Praha.

Kríž, J. 2000. Lochkovian bivalves of Bohemian type from the eastern Anti-Atlas (Lower Devonian, Morocco).- Senckenbergiana lethaea, 80(2):485-523, Frankfurt am Main.

Kríž, J., Frýda, J. and Galle, A. 2001. The epiplanktic anthozoan, *Kolihaia eremita* Prantl, 1946 (Cnidaria), from the Silurian of the Prague Basin (Bohemia). -J. Czech Geol. Soc., 46(3-4):239-245. Praha.

Kríž, J. 2001. Vladimír Havlícek in Brachiopod Paradise.- J. Czech Geol. Soc., 46(3-4):84-85, Praha.

Kríž, J. 2001. Enantiomorphous dimorphism in Silurian and Devonian bivalves; *Maminka* BARRANDE, 1881 (Lunulacardiidae, Silurian) - the oldest known example .- Lethaia, 34:309-322, Oslo.

Le Hérissé, A., 2000. Characteristics of the acritarch recovery in the early Silurian of Saudi Arabia. In S. Al-Hajri and B. Owens : Stratigraphic palynology of the Paleozoic of Saudi Arabia. Geoarabia, volume special : 57-81.

Le Hérissé, A., 2001. Evolution of Devonian phytoplanktonic assemblages in the upper Erere Formation and Curua Group (Barreirinha and lower Curiri Formations) Tapajos River area, Amazon Basin, northern Brazil. Cienca Tecnica Petroleo. Secao : Exploracao de Petroleo, n°20 : 117-124.

Le Hérissé, A., Melo, J.H.G., Quadros, L.P., Grahn, Y., & Steemans, P. 2001: Palynological characterization and dating of the Tianguá Formation, Serra Grande Group, northern Brazil. Correlação de seqüèncias Paleozóicas Sul Americanas (Melo, J.H.G. & Terra, G.J.S., eds.) Ciència - Técnica - Petróleo. Seção: Exploração de Petróleo n° 20: 25-41.

Le Hérissé, A., Servais, T. and Wicander, R., 2000. Devonian acritarchs and related forms. Subcommission on Devonian Stratigraphy. Volume II : Fossils groups important for boundary definition. Courier Forschungsinstitut Senckenberg Franfurt a.M., 220 : 195-205.

Legrand, Ph. 2000. Une région de référence pour la limite Ordovicien -Silurien : l'Oued In Djerane. Sahara algérien. C.R. Acad. Sci. Paris, Sciences de la Terre et des Planètes, 330, 61-66.

Legrand, Ph. 2000. Complexité de la sédimentation détritique fini-glaciaire à l'Ordovicien terminal et au Silurien inférieur sur la plate-forme saharienne. Sonatrach, C.R.D., Sciences et Technologies des Hydrocarbures, 3, (1), 7-16.

Legrand, Ph. 2001. La faune graptolitique de la région d'In Azaoua (Tassili Oua-n-Ahaggar, confins algéro-nigériens). Ann Soc. géol. du Nord, (2ème série),8, p. 137-158.

Lenz, A.C. and Kozlowska-Dawidziuk, A. 2001. Upper Wenlock (Silurian) graptolites from Arctic Canada: pre-extinction, *lundgreni* Biozone fauna. Palaeontographica Canadiana n. 20:1-61.

Lenz, A.C. and Kozlowska-Dawidziuk, A. 2002. Upper Homerian (Upper Wenlock, Silurian) graptolites from Arctic Canada. Journal of Paleontology, 76:319-344.

Loydell, D. K. 2001. Discussion on Ludlow (late Silurian) oceanic episodes and events. Journal of the Geological Society, London, 158, 731-732.

Loydell, D. K. and Loveridge, R. F. 2001. The world's longest graptolite? Geological Journal, 36, 55-57.

Loydell, D. K., Mallett, A., Mikulic, D. G., Kluessendorf, J. and Norby, R. D. 2002. Graptolites from near the Ordovician-Silurian boundary in Illinois and Iowa. Journal of Paleontology, **76**, 134-137.

Lüning, S., Craig, J., Fitches, B., Mayouf, J., Busrewil, A., El Dieb, M., Gammudi, A. and Loydell, D. 2000. Petroleum source and reservoir rock re-evaluation in the Kufra Basin (SE Libya, NE Chad, NW Sudan). 151-173. *In* Sola, M. A. and Worsley, D. (eds). Geological Exploration in Murzuq Basin. Elsevier, Amsterdam, 534 pp.

Maletz, J. 2001. Graptolite Research in Germany. - Geologica Saxonica (Abhandlungen des Staatlichen Museums für Mineralogie und Geologie Dresden) 46/47, 169-180.

Maletz, J., Suarez Soruco, R. & Egenhoff, S. O. 2002. Upper Silurian (Ludlow) graptolites in Bolivia. - Palaeontology 45, 327-341.

Manda, S. (2001). Some new or little known cephalopods from the Lower Devonian Pragian carbonate shelf (Prague Basin, Bohemia) with remarks on Lochkovian and Pragian cephalopod evolution.- J. Czech Geol. Soc., 46(3-4):269-286, Praha.

Männik, P. 2001. Evolution of early Silurian conodont faunas, and high-resolution stratigraphy, p. 202-205. In Podobina, V. M. (ed.), Evolution of life on the Earth. Proceedings of the II International Symposium "Evolution of life on the Earth", November 12-15, 2001, Tomsk. Tomsk, NTL.

Männik, P. 2001. Distribution of conodonts, p. 10-12. *In* Põldvere, A. (ed.) Valga (10) drill core. Estonian Geological Sections, Bulletin 3

Märss T. 2000. Silurian vertebrate studies during 1990-1996. - In: Blieck A. and Turner S. (eds). Palaeozoic Vertebrate Biochronology and Global marine/Non-Marine Correlations. Final Report of IGCP 328 (1991-1996). Courier Forschungsinstitut Senckenberg, 223, 81-90.

Märss T. 2000. *Lophosteus* Pander from the Pridoli, Upper Silurian of Cornwallis Island, Arctic Canada. In: Antoshkina A., Malysheva E. and Wilson M.V.H. (eds). Pan-Arctic Palaeozoic Tectonics, Evolution of Basins and Faunas. Syktyvkar, Russia, July 12-15, 2000. Ichthyolith Issues. Special Publications 6, p.68.

Märss T. 2001. *Andreolepis* (Actinopterygii) in the Upper Silurian of northern Eurasia. - Proceedings of the Estonian Academy of Sciences. Geology, 50(3), 190-206.

Märss T. 2001. *Andreolepis* from the Upper Silurian of the Central Urals. Obruchev Symposium "Evolutionary Palaeoichthyology", Moscow, 13-16 March, 2001, Palaeontological Institute of the RAS. Programme & Abstracts Volume, p. 32.

Märss T. 2002. Silurian and Lower Devonian anaspids (Agnatha) from Severnaya Zemlya (Russia). Geodiversitas, 24(1), 123-137.

Märss T. and Gagnier P.-Y. 2001. A new chondrichthyan from the Wenlock, Lower Silurian, of Baillie-Hamilton Island, the Canadian Arctic. - Journal of Vertebrate Paleontology, 21(4), 687-695.

Märss, T., Wilson, M.V.H. and Thorsteinsson, R. 2002. New thelodont (Agnatha) and possible chondrichthyan (Gnathostomata) taxa established in the Silurian and Lower Devonian of Arctic Canada. Proceedings of the Academy of Sciences. Geology, 51(2), 88-120.

Märss T. and Karatajute-Talimaa V. 2002. Ordovician and Lower Silurian thelodonts from Severnaya Zemlya Archipelago. Geodiversitas, 24 (2).

Melchin, M.J. and Koren', T.N. 2001. Morphology and phylogeny of some early Silurian (mid-Rhuddanian) monograptid graptolites from the south Urals of Russia. Journal of Paleontology, 75, 165-185.

Mullins, G. L. and Loydell, D. K. 2001. Integrated Silurian chitinozoan and graptolite biostratigraphy of the Banwy River section, Wales. Palaeontology, 44, 731-781.

Mullins, G. L. and Loydell, D. K. 2002. Integrated lower Silurian chitinozoan and graptolite biostratigraphy of Buttington Brick Pit, Wales. Geological Magazine, 139, 89-96.

Munson, T.J., Pickett, J..W. & Strusz, D.L., 2000 - Biostratigraphic review of the Silurian tabulate corals and chaetetids of Australia. Historical Biology 15, 41-60

Nestor, H., Einasto, R., Nestor, V., Marss, T. & Viira, V. 2001. Description of the type section, cyclicity, and correlation of the Riksu Formation (Wenlock, Estonia). Proceedings of the Estonian Academy of Sciences, Geology, v. 50, no 3, 149-173.

Nestor H., and C.W. Stock. 2001. Recovery of the stromatoporoid fauna after the Late Ordovician extinction. Bulletin of the Tohoku University Museum, no. 1, p. 274-279.

Paris, F., Bourahroux, A., & Le Hérissé, A., 2000. The effects of the final stages of the Late Ordovician glaciation on marine palynomorphs (chitinozoans, acritarchs, leiospheres) in well NL2 (NE Algerian Sahara) Rev . Paleobot. Palynol., vol.113, fasc. 1-3 : 87-104.

Piçarra, J.M. & Gutiérrez-Marco, J. C.. 2001. Revisão preliminar dos graptólitos silúricos portugueses de tipo "sardo". In: MELÉNDEZ,G., HERRERA,Z., DELVENE,G. & AZANZA,B. (eds.), Los fósiles y la Paleogeografia. Publicaciones del Seminario de Paleontologia de Zaragoza, 5 (2), 430-440, Zaragoza.

Pickett, J.W., Burrow, C.J., Holloway, D.J., Munson, T.J., Percival, I.G., Rickards, R.B., Sherwin, L., Simpson, A.J., Strusz, D.L., Turner, S., & Wright, A.J. 2000. Silurian Palaeobiogeography of Australia. In Wright, A.J., Young, G.C., Talent, J.A. & Laurie, J.R. (Editors) Palaeobiogeography of Australasian Faunas and Floras. Memoirs, Association of Australasian Palaeontologists 23, 127-165.

Pyle L. J. and Barnes, C. R. 2001. Ordovician-Silurian stratigraphic framework along a Macdonald Platform to Ospika Embayment transect, northeastern British Columbia. Bull. Can. Petroleum Geology, v. 49, p. 513-535.

Pyle, L. J and Barnes, C. R. 2001. Conodonts from the Kechika Formation and Road River Group (Lower to Upper Ordovician) of the Cassiar Terrane, northern British Columbia. Canadian Journal of Earth Sciences, v. 38, p. 1387-1401.

Pyle, L. J. and Barnes, C. R. 2001. Lower Paleozoic conodont studies in the Northern Canadian Cordillera. Fourth BC Paleontology Conference, Kamloops, May 10-14, Program with Abstracts.

Pyle. L. J and Barnes, C. R. 2002. Taxonomy, evolution and biostratigraphy of conodonts from the Kechika Formation, Skoki Formation and Road River Group (Upper Cambrian to Lower Silurian), northeastern British Columbia. National Research Council of Canada, Monograph, Earth Sciences Series, 224 p.

Quadros, L.P., Melo, J.H.G., Grahn, Y., Steemens, P. & Le Hérissé, A. 2000: Palynological characterization and dating of the Tianguá Formation, Serra Grande Group, Parnaíba Basin, northern Brazil. CD Rom, 3!st IGC, Rio de Janeiro.

Rickards, R.B., Ortega, G., Bassett, M., Boso, M.A. and Monaldi, C.R. (in press). *Talacastograptus*, an unusual biserial graptolite, and other Silurian forms from Argentina and Bolivia. Ameghiniana.

Rickards, R.B., Percival, I.G., Simpson, A.J. & Wright, A.J. 2001. Silurian biostratigraphy of the Cadia area, south of Orange, New South Wales. Proceedings of the Linnean Society of New South Wales 123: 173-191.

Rong Jia-yu and Chen Xu 2000. Comments on Silurian Chronostratigraphy of China. Journal of Stratigraphy, 24(1):27-35. (in Chinese with English abstract).

Rong Jia-yu, Chen Xu, Harper, D.A.T. and Mitchell, C.E. 2000. Proposal of a GSSP Candidate Section in South China for a new Hirnantian Boundary Stratotype. Journal of Stratigraphy, 24(3):176-181. (in Chinese with English abstract).

Rong Jia-yu, Fang Zong-jie and Liao Wei-hua 2001. Preliminary study on mass extinction and recovery of marine invertebrates in South China,459-474. In Chow Yienshing et al.(eds.) Proceedings of the 2000' Cross-starit Symposium on Bio-diversity and Conservation. Natioanl Museum of Natural Science, Taichung. 1-555pp.(in Chinese with English abstract)

Rong Jia-yu, Markes E. Johnson, Gudveig Baarli, Li Wen-guo, Su Wen-bo, and Wang Jian 2001. A continental island of Late Silurian in Sino-Korean Plate. Chinese Science Bulletin 46(3):238-241.

Rubinstein, C., 2001. Microflora y microplancton silúricos de la Precordillera Central de San Juan, Argentina. En: Palinología: Diversidad y Aplicaciones. Fombella Blanco, M. A.,

Fernández González, D., Valencia Barrera, R. M. (eds.). Secretariado de Publicaciones, Universidad de León, León (España), pp. 45- 54.

Rubinstein, C. V., 2001. Correlaciones entre las cuencas ordovícicas y silúricas de la Argentina basadas en el estudio de acritarcos, criptoesporas y mioesporas. Correlação de seqüències Paleozóicas Sul-Americanas (Melo, J.H.G. & Terra, G.J.S., eds.) Ciència - Técnica - Petróleo. Seção: Exploração de Petróleo n° 20: 19-24.

Rubinstein, C. & Steemans, P., 2002. Miospores assemblages from the Silurian-Devonian boundary, in borehole A1-61, Ghadamis Basin, Libya. Review of Palaeobotany and Palynology, 118(1-4): 397-421.

Rubinstein, C. V. & Vaccari, N. E., 2001. Palynomorphs of the Ordovician - Silurian boundary in the Salar del Rincón Formation, Argentine Puna. First Meeting of the C.I.M.P. Spores and Pollen Subcommission, National University of Ireland, Cork, Ireland. Abstracts, pp. 40- 41.

Russel, J.C., Melchin, M.J. and Koren', T.N. 2000. Development, taxonomy and phylogenetic relationships of some species of *Paraclimacograptus* (Graptoloidea) from the Canadian Arctic and the Southern Urals of Russia. Journal of Paleontology, 74, 84-91.

Soehn K.L., Hanke G. F., Märss T. and Wilson M. V. H. 2000. Preliminary vertebrate biostratigraphy of the Avalanche Lake sections (Wenlock, Silurian), southern Mackenzie Mountains, N.W.T., and review of northwestern Canadian vertebrate localities of Silurian Age. In: Blieck A. and Turner S. (eds). Palaeozoic Vertebrate Biochronology and Global marine/Non-Marine Correlations. Final Report of IGCP 328 (1991-1996). Courier Forschungsinstitut Senckenberg, 223, 129-156.

Soehn K.L., Märss T., Caldwell M.W. and Wilson M.V.H. 2001. New and biostratigraphically useful thelodonts from the Silurian of the Mackenzie Mountains, Northwest Territories, Canada. - Journal of Vertebrate Paleontology, 21(4), 651-659.

Soehn, K.L., Märss, T., Caldwell M.W. and Wilson M.V.H. 2001. New, biostratigraphically useful thelodonts from the Silurian of the Mackenzie Mountains, Northwest Territories, Canada. Journal of Vertebrate Paleontology. Abstracts of Papers. 61st Annual Meeting of the Society of Vertebrate Paleontology. Museum of the Rockies Montana State University Bozeman, Montana, October 3-6, 2001, 21 (Supplement to Number 3: 103A).

Stock, C.W., and H. Nestor. 2000. The fall and rise of stromatoporoids in association with the end-Ordovician mass extinction. Geological Society of America Abstracts with Programs, 32(4):A-62.

Stock, C.W., and H. Nestor. 2001. Centers of origination of Early Silurian (Llandovery) stromatoporoids. Geological Society of America Abstracts with Programs, 33(2):A-57.

Strusz, D.L., 2000 - Revision of the Silurian and Early Devonian chonetoidean brachiopods of southeastern Australia. Records of the Australian Museum 52(3), 245-287.

Strusz, D.L., in press 2002 - Brachiopods of the orders Protorthida and Orthida from the silurian of the Yass Syncline, southern New South Wales. Alcheringa

Talent, J.A., Mawson, R., Brock, G.A., Furey-Greig, T., Molloy, P.D. & Simpson, A.J., 2001. Lost carbonate platforms (Cambrian-Devonian) in eastern Australia: tectonostratigraphic implications. 15th International Senckenberg Conference (May 11-21, 2001): Mid-Palaeozoic Bio- and Geodynamics: the North Gondwana-Laurussia Interaction. Abstracts, 93-94.

Thanh T.-D., A. J. Boucot, Rong Jia-yu, and Fang Zong-jie, 2001. Late Silurian marine shelly fauna of central and northern Vietnam. Geobios, 34(3): 315-338.

Turner, S. 2001. IGCP Project No. 406 Circum-Arctic Palaeozoic vertebrates 1996-2000 (On Extended Time in 2001). *The Australian Geologist* no. 121, 20 Dec., 22-23.

Turner, S. (in press, 2002). Fish kills; a new database for Gondwana. IPC Conference Sydney July 6-10, abstracts

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

Turner, S., Blieck, A. R.M. & Nowlan, G.S. (in press). Cambrian-Ordovician vertebrates database. Bull. GS du Nord.

Vandenbroucke, T., Verniers, J., & Clarkson, E.N.K. (accepted). A chitinozoan biostratigraphy of the Upper Ordovician and lower Silurian strata of the Girvan area, Midland Valley, Scotland. Transactions of the Royal Society of Edinburgh, Earth Sciences.

Vergoossen, J.M.J., 2000. Acanthodian and chondrichthyan microremains in the Siluro-Devonian of the Welsh Borderland, Great Britain, and their biostratigraphical potential. - - Cour. Forsch. -Inst. Senckenberg, 223: 175-199

Vergoossen, J.M.J., 2002a. Late Silurian fish microfossils from Ramsåsa, locality H, Scania, south Sweden, with some remarks on the body zonation scheme used in thelodont studies. - - Scripta Geol., 123: 41-69.

Vergoossen, J.M.J., 2002b. Late Silurian fish microfossils from Klinta and Rinnebäcks Bro (Scania, south Sweden), with remarks on the morphology of *Nostolepis striata* trunk scales. -- Scripta Geol., 123: 71-92.

Vergoossen, J.M.J., 2002c. Late Silurian fish microfossils from Ramsåsa (sites D and 'south of church'), Skåne, south Sweden. -- Scripta Geol., 123: 93-158.

Verniers, J., Herbosch, A., Van Guestaine, M., Geukens, F., Delcambre, B., Pingot, J.L., Bellanger, I., Hennebert, M., Debacker, T., Sintubin, M. & De Vos, W. (2001) Cambrian-Ordovician-Silurian lithostratigraphical units (Belgium) in P. Bultynck & L. Dejonghe (Eds.) Lithostratigraphical Scale of Belgium. Geologica Belgica, 4 (1-2), 5-38.

Verniers, J., Pharaoh, T., André, L., Debacker, T., De Vos, W., Everaerts, M., Herbosch, A., Samuelsson, J., Sintubin, M., & Vecoli, M. (in press). The Cambrian to mid Devonian basin development and deformation history of eastern Avalonia, east of the Midlands Microcraton: new data and a review. Geological Society, London, Special Publication

Verniers, J., Pharaoh, T., André, L., Debacker, T., De Vos, W., Everaerts, M., Herbosch, A., Samuelsson, J., Sintubin, M., & Vecoli, M. (2001). Cambrian to Devonian Basin Development and Collision History of Eastern Avalonia**.** Abstracts volume of the "European Union of Geosciences" in Strasbourg, France, 8-12 April 2001, p. 360.

Verniers, J., Van Grootel, G., Louwye, S., & Diependaele, B. 2001 The chitinozoan biostratigraphy of the Silurian of the Ronquières-Monstreux area (Brabant Massif, Belgium). Abstract for the International Symposium "Jubilee Session PPMB-CIMP Stanislas Loboziak " Lille, 11-12-2001. (2 p.)

Verniers, J., Van Grootel, G., Louwye, S., & Diependaele, B., (in press). The chitinozoan biostratigraphy of the Silurian of the Ronquières-Monstreux area (Brabant Massif, Belgium). Review of Palaeobotany and Palynology, 118.

Wang Bao-yu, Zhang Zi-xin, Rong Jia-yu, Wang Cheng-yuan, and Cai Tu-ci, 2001. Silurian and Devonian Stratigraphy and Faunas in Southern Tianshan, Xinjiang. 130pp. 57pls. Publishing House of China University of Science and Technology (in Chinese).

Wilson M.V.H., Thorsteinsson R. and Märss T. 2000. Articulated Thelodonts from the Lower Wenlock (Lower Silurian) of the Cape Phillips Formation, Canadian Arctic Archipelago. In: 9th Annual International Symposium "Early Vertebrates/Lower Vertebrates". Flagstaff, Arizona, May 16th-19th, 2000, p. 22.

Zhang Mi-man and Chen Xu 2001. Palaeontology: Progress in the last Century and developing strategy for the coming decades. Advance in Earth Sciences, 16(5): 624-628.

Zhang, S. and Barnes, C. R. 2001. Conodonts and glaciation: an example from the Late Ordovician and Early Silurian, Anticosti Island, Quebec. Fourth BC Paleontology Conference, Kamloops, May 10-14, Program with Abstracts.

Zhang, S and Barnes, C. R. 2002. New Llandovery conodont biozonation and pectiniform-ramiform conodonts from the Becscie, Merrimack and Gun River formations, Anticosti Island, Quebec. Journal of Paleontology v. 76, suppl. to No. 2, Paleontological Society, Memoir 57, 46 p.

Zhang, S., and Barnes, C. R. 2002. Paleoecology of Llandovery conodonts, Anticosti Island, Quebec. Paleogeography, Paleoclimatology, Paleoecology v. 179, p. 1-23.

Zhang, S. and Barnes, C. R. 2002. Eustatic sea level curve for the Ashgillian-Llandovery derived from conodont community analysis, Anticosti Island, Québec. Paleogeography, Paleoclimatology, Paleoecology, v. 179, p. 24-52.

NEW NAMES AND ADDRESS CHANGES

[Note: for all the (hopefully) most up-to-date e-mail addresses, see E-MAIL ADDRESSES below]

Robert J. Elias
Department of Geological Sciences
University of Manitoba
Winnipeg, Manitoba
Canada R3T 2N2

David Gelsthorpe
Palaeobiology Research Group
Department of Geology
University of Leicester
University Road
Leicester
LE1 7RH

Dr. Jorg Maletz
Department of Geology
State University of New York at Buffalo
771 Natural Sciences and Mathematics Complex
Buffalo, New York 14260-3050
U.S.A.

Andy Mallett
School of Earth, Environmental and Physical Sciences
University of Portsmouth
Burnaby Building
Burnaby Road
Portsmouth
PO1 3QL, UK

E-MAIL ADDRESSES

Guilermo Acenolaza - insugeo@unt.edu.ar
Aicha Achab - achab@NRCan.gc.ca
Dick Aldridge - RA12@leicester.ac.uk
Fernando Alvarez - fernando@asturias.geol.uniovi.es
Anna Antoshkina - Antoshkina@geo.komisc.ru
H.A. Armstrong - h.a.armstrong@durham.ac.uk
Esther Asselin - EAsselin@nrcan.gc.ca
R.A. Astini - rastini@satlink.com
William Ausich - Ausich.1@osu.edu
Gudveig Baarli - Gudveig.Baarli@williams.edu
C.R. Barnes - crbarnes@uvic.ca
J.E. Barrick - ghjeb@TTACS.TTU.EDU
Jim Basinger - jim.basinger@sask.usask.ca
Michael Bassett - bassett@cardiff.ac.uk
Richard Batchelor - rab@st-andrews.ac.uk
Denis Bates - deb@aber.ac.uk
J.L. Bendetto - jbenedetto@com.uncor.edu
Michael Benton - mike.benton@bristol.ac.uk
Claes Bergman - bec@hkgemfs.hkr.se
Stig Bergström - stig@geology.ohio-state.edu
Bill Berry - bberry@uclink4.berkeley.edu
Tatyana Besnosova - Beznosova@geo.komisc.ru
Alain Blieck - Alain.Blieck@univ-lille1.fr
Robert Blodgett - blodgetr@bcc.orst.edu
Henning Blom -
Olga Bogolepova - olga.bogolepova@pal.uu.se
Art Boucot - boucota@bcc.orst.edu
Pierre-André Bourque - bourque@ggl.ulaval.ca
Margaret Bradshaw -
mbradshaw@geol.canterbury.ac.nz
P.J. Brenchley - pat@bbrenchley.fsnet.co.uk
Carlton Brett - brettce@email.uc.edu
Thomas Broadhead - twbroadhead@utk.edu
Frank Brunton - brunton@sciencenorth.on.ca
Edsel Brussa -
Carole Burrow - CBurrow@zoology.uq.edu.au
Mikael Calner - Mikael.calner@geol.lu.se
Deirdra Cantrell - cantr004@bama.ua.edu
Robin Cantrill - rcantril@postoffice.utas.edu.au
M.V. Caputo - caputo@nautilus.com.br
Brian Chatterton - bchatter@gpu.srv.ualberta.ca
Xiaoheng Chen - haoling@126.com
Chen Xu - xuchen@jlonline.com
Lesley Cherns - cherns@cardiff.ac.uk
Alfredo Cingolani -
CCINGOLA@CIG.MUSEO.UNLP.EDU.AR
Gina Christodoulu - Gina.Christodoulou@Geol.lu.se
Euan Clarkson - EUAN@glg.ed.ac.uk
Robin Cocks - R.Cocks@nhm.ac.uk
Paul Copper - pcopper@nickel.laurentian.ca
Carlo Corradini - ccorr@unimo.it
Peter Crowther - peter.crowther.um@nics.gov.uk
Alfredo Cuerda - acuerda@sinectis.com.ar
Tim de Freitas - tdefreitas@talisman-energy.com
Enrique Díaz Martínez - diazme@inta.es
Richard Diecchio - rdiecchi@gmu.edu
Steven Driese - sdriese@utk.edu
Pavel Dufka - pavel.dufka@leo.burnett.cz
Diane Edwards - edwardsd2@cardiff.ac.uk
Greg Edgecombe - greged@amsg.austmus.gov.au
Rein Einasto - einasto@gi.ee
Bob Elias - eliasrj@ms.umanitoba.ca
Maria Eriksson - mariae@geo.su.se
Mats Erikssson - Mats.Eriksson@geol.lu.se
Frank Ettensohn - fettens@pop.uky.edu
Robert Fakundiny - rfakundini@MAIL.NYSED.GOV
Annalisa Ferretti - ferretti@unimo.it
Stan Finney - scfinney@csulb.edu
Barry Fordham - barry.fordham@bigpond.com
Jiri Fryda - fryda@cgu.cz
David Gelsthorpe - dng1@leicester.ac.uk
Maurizio Gnoli - gnolim@unimo.it
Yngve Grahn - grahn@uerj.br
Alexander Gubanov - Alexander.Gubanov@pal.uu.se
Juan Carlos Gutiérrez Marco -
jcgrapto@eucmax.sim.ucm.es
Wolfgang Hansch - Wolfgang.Hansch.Mus.HN@t-
online.de
David Harper - dharper@savik.geomus.ku.dk
Mark Harris - mtharris@csd.uwm.edu
William Harrison - william.harrison_iii@wmich.edu,
Jonas Hagstrom - jonas.hagstrom@geo.su.se
Rachel Heath - arjay_h@yahoo.co.uk
Kathleen Histon - Cathleen.Histon@cc.geolba.ac.at
Anette Hogstrom - anette@ucrac1.ucr.edu;
ahogstrom@hotmail.com
Charles Holland - hepwholl@tcd.ie
M.P.A. Howe
Jana Hutt - jolyonjana@btinternet.com
Magdalena Iordan - antoneta@ns.igr.ro
Mikael Jacobsson - Mikael.Jacobsson@Geol.lu.se
John Jell
Lennart Jeppsson - lennart.jeppsson@geol.lu.se
Fredrik Jerre - Fredrik.Jerre@astrazeneca.com
Jisuo Jin - jjin@julian.uwo.ca
Markes Johnson - Markes.E.Johnson@williams.edu
Paul Johnston - Paul.Johnston@gov.ab.ca
Anna Jones - anna@sherborne11.fsnet.co.uk
Dimitri Kaljo - kaljo@gi.ee
Donatas Kaminskas - Donatas.Kaminskas@gf.vu.lt
Stephen Kershaw - Stephen.Kershaw@brunel.ac.uk
Guennadji Kisselev - anna@dean.geol.lgu.spb.su
Mark Kleffner - kleffner.1@osu.edu
Joanne Kluessendorf - jkluesse@uiuc.edu
Tania Koren - tkoren@mail.wplus.net
Anna Kozlowska-Dawdziuk - akd@twarda.pan.pl
Petr Kraft
Jiri Kriz - kriz@cgu.cz
Jeff Kuglitsch - kug@globaldialog.com
Philippe Legrand - legrandblain@wanadoo.fr
A. LeHérissé - alain.le.herisse@univ-brest.fr
Oliver Lehnert - lehnert@geol.uni-erlangen.de
Alfred Lenz - aclenz@julian.uwo.ca
Pierre Lespérance -
lesperap@MAGELLAN.UMontreal.CA
Steven LoDuca -
GEO_LODUCA@ONLINE.EMICH.EDU
Darrel Long - dlong@nickel.laurentian.ca
David Loydell - david.loydell@port.ac.uk
Robert Lundin - robert.lundin@asu.edu

Eugene MacDonald - ewmacdon@is2.dal.ca
Jorg Maletz - jorgm@acsu.buffalo.edu
Andy Mallett - Andy.Kaz@btinternet.com
Peep Männik - mannik@gi.ee
Tiiu Märss - marss@gi.ee
Ruth Mawson - rmawson@laurel.ocs.mq.edu.au
Sandy McCracken - samccrac@NRCan.gc.ca
Mike Melchin - mmelchin@stfx.ca
Carl Mendelsohn - mendelsn@beloit.edu
Donald Mikulic - mikulic@isgs.uiuc.edu
Giles Miller - G.Miller@nhm.ac.uk
Chuulin Minjin - minjin@mtu.edu.mn
Charles Mitchell - cem@acsu.buffalo.edu
Tania Modzalevskaya - modz@IB2567.spb.edu
Stewart Molyneux - SGM@wpo.nerc.ac.uk
Gary Mullins - glm2@le.ac.uk
Mike Murphy - MamurphyD@aol..com
Petras Musteikis - Petras.Musteikis@gf.vu.lt
Heldur Nestor - hnestor@gi.ee
Viiu Nestor - vnestor@gi.ee
Paula Noble - noblepj@unr.edu
Brian Norford - bnorford@NRCan.gc.ca
Godfrey Nowlan - GNowlan@NRCan.gc.ca
James Ogg - jogg@purdue.edu
Gladys Ortega - gcortega@arnet.com.ar
Jeffrey Over - over@geneseo.edu
Florentin Paris - Florentin.Paris@univ-rennes1.fr
John Peel - John.Peel@pal.uu.se
Silvio Peralta - speralta@unsj.edu.ar
José Manuel Picarra - jose.picarra@igm.pt
Elzbieta Porebska - porebska@geos.ing.uj.edu.pl
Helga Priewalder - hpriewalder@cc.geolba.ac.at
Isabel Rabano -
David Ray - raydc@email.uc.edu
Jürgen Remane - jurgen.remane@geol.unine.ch
John Richardson - jbr@nhm.ac.uk
Barrie Rickards - wagreen@esc.cam.ac.uk
Susan Rigby - SUERIGBY@glg.ed.ac.uk
Michel Robardet - Michel.Robardet@univ-rennes1.fr
Rong Jia-yu - jyrong@nigpas.ac.cn
June Ross - ross@biol.wwu.edu
Madis Rubel - rubel@math.ut.ee
Claudia Rubenstein - rubicaro@supernet.com.ar
David Rudkin - davidru@rom.on.ca
Jennifer Russel-Houston - Jen.Russel-Houston@shell.ca
Valeri Sachanski - valeri@geology.bas.bg
T.M. Sanchez - tsanchez@com.uncor.edu
Olof Sandström -
Ivan Sansom - I.J.Sansom@bham.ac.uk
Kate Saunders -
Hans Peter Schönlaub - schhp@cc.geolba.ac.at
C.T. Scrutton - C.T.Scrutton@durham.ac.uk
N.V. Sennikov - sennikov@uiggm.nsc.ru
Enrico Serpagli - serpagli@unimo.it
Peter Sheehan - sheehan@csd.uwm.edu
Lawrence Sherwin - sherwinl@minerals.nsw.gov.au
Andrew Simpson - asimpson@els.mq.edu.au
David Siveter - DJS@leicester.ac.uk
Derek Siveter - derek.siveter@earth.ox.ac.uk
Rimma Sobolevskaya -
Ken Soehn - ksoehn@mac.com
Constance Soja - csoja@MAIL.COLGATE.EDU
Azzedine Soufiane - ess-inrs-asoufiane@x1.nrcan.gc.ca
Ronald Stieglitz - stieglir@uwgb.edu
Carl Stock - cstock@wgs.geo.ua.edu
Rob Stallard - rob@silurian.com
Petr Storch - storch@gli.cas.cz
Sven Stridsberg - Sven.Stridsberg@Geol.lu.se
Paul Strother - strother@bc.edu
Des Strusz - dstrusz@geology.anu.edu.au
Stuart Sutherland -
John Talent - jtalent@laurel.ocs.mq.edu.au
Lech Teller - l.teller@twarda.pan.pl
Y.I. Tesakov - tesakov@uiggm.nsc.ru
A.T. Thomas - A.T.Thomas@bham.ac.uk
Judi Thorogood - Judethorogood@hotmail.com
Susan Turner - s.turner@mailbox.uq.edu.au
Charles Underwood - cju@liverpool.ac.uk
Adam Urbanek - urbanek@twarda.pan.pl
J.M.J. Vergoossen - J.M.J.Vergoossen@biol.rug.nl
Jacques Verniers - Jacques.Verniers@rug.ac.be
Viive Viira - viira@gi.ee
Wang Xiaofeng - wxfeng@public.yc.hb.cn
Rodney Watkins - rw@mpm.edu
Brian White - bwhite@science.smith.edu
Rosie Widdison - rewiddison@hotmail.com
Mark Williams - Mark.Williams@bgs.ac.uk
S. Henry Williams - hwilliam@petro-canada.ca
Mark Wilson - mark.wilson@ualberta.ca
Brian Witzke - bwitzke@igsb.uiowa.edu
A.D. Wright - a.wright@qub.ac.uk
Tony Wright - awright@uow.edu.au
Ryszard Wrona - wrona@twarda.pan.pl
Evgeny Yolkin - yolkin@uiggm.nsc.ru
Graham Young - gyoung@cc.UManitoba.CA
Jan Zalasiewicz - JAZ1@leicester.ac.uk
Matthew Zimmerman - zimmer@mines.unr.edu