Ordovician NEWS

IUGS COMMISSION ON STRATIGRAPHY

SUBCOMMISSION ON ORDOVICIAN STRATIGRAPHY

NO. 12 1995

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NOTES FOR CONTRIBUTORS

The continued health and survival of *Ordovician News* depends on YOU to send in items of Ordovician interest such as lists and reviews of recent publications, brief summaries of current research, notices of relevant local, national and international metings, etc. As more geological software becomes available, details of this would also be welcomed by many of us. Also please ensure that I am notified of any changes in address, telephone or fax number and e-mail address. Submissions for inclusion in the next issue of *Ordovician News* should arrive before 31 January 1996; when providing lists of recent publications, please include only fully refereed articles and books (not abstracts) published during 1995.

Contributions should be in English, typed double space and sent to: S.H. Williams, Department of Earth Sciences, Memorial University of Newfoundland, St. John's, Newfoundland A1B 3X5, Canada, OR ideally via e-mail, as this saves a lot of retyping. For longer contributions, it would help if a copy was sent either on 3 1/2" diskette (either Macintosh or IBM, but please state operating system and software used) or via e-mail (preferably as encoded file).

EDITOR'S NOTE

My thanks go to Gerry Squires for help with the typing of this issue of *Ordovician News*. A full updated directory of Ordovician Subcommission members who are now on e-mail networks is included in the current issue. I am now sending notices, requests for contributions, etc. via this method in addition to mailing material, so please keep me informed of any new or revised addresses (send to williams@sparky2.esd.mun.ca). A summary by Barry Webby of Ordovician Subcommission Titular Members, meetings and publications from its inception to date is included in this issue (pp. 5-8), which we hope will be of interest and use, particularly to those who may have only recently become involved in Subcommission work. I look forward to seeing many of you in Las Vegas.

Henry Williams

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SUMMARY OF THE 1994 ANNUAL REPORT FROM THE SUBCOMMISSION ON ORDOVICIAN STRATIGRAPHY TO IUGS

2. Overall objectives

The Subcommission aims to promote interational cooperation in Ordovician stratigraphy. Specific objectives are:

a. To delimit and subdivide the Ordovician System (and Period) as a part of the overall ICS work to elaborate the standard global stratigraphic scale. This work aims to establish the boundaries (GSSPs), the correlation of the subdivisions (Stages and Series), and the nomenclature of the subdivisions.

b. To promote regular international meetings on aspects of Ordovician geology, especially those devoted to clarifying stratigraphic proceedures, nomenclature and methods for use in establishing a unified global time scale, and to prepare correlation charts with explanatory notes (this latter task now completed).

3. Organization

a. Subcommission Executive:

Chairperson, B.D. Webby (Australia)
Vice chairperson, Chen Xu (P.R. China)
Secretary, S.H. Williams (Canada)
19 other Voting Members
79 Corresponding Members

b. Cambrian/Ordovician Boundary Working Group:

Chairperson, R.A. Cooper (New Zealand)
Secretary, G. Nowlan (Canada)
11 other Voting Members
57 Corresponding Members

c. Informal intra-System Working Groups

Convenors of these groups are as follows:
(i) base of *approximatus* (base of "Arenig") W.B.N. Berry & S.H. Williams
(ii) base of *triangularis/laevis* (base of "Whiterock") - R.J. Ross Jr
(iii) bases of *austrodentatus* & *artus* (base of "Llanvirn") - D. Bruton & C.E. Mitchell
(iv) bases of *gracilis*, *undatus/americanus* and *ordovicicus/complanatus* (bases of "Caradoc" & "Ashgill") - S.M. Bergstrom & C.R. Barnes

4. Extent of national/Regional/Global support for projects

Independent support for projects comes mainly from individual Ordovician workers, through their employer organizations, and through individual to multidisciplinary, cooperative, team activities supported by grants from national/regional government-funded bodies.

SOS receives no formal support from international organizations outside IUGS/ICS.

5. Interface with other international projects

The membership of the Subcommission both geographically and in terms of research interests effectively reflects available expertise in aspects of Ordovician stratigraphy.

The Subcommission has no formal links with other global projects, though some individual Ordovician workers are members of IGCP projects, most notably the following:

Project 319: Global Palaeogeography of the Late Precambrian and Early Paleozoic (Lower Ordovician only)
Project 321: Gondwana dispersion and Asian accretion
Project 328: Palaeozoic microvertebrate biochronology and marine/nonmarine correlation
Project 335: Biotic Recovery from Mass Extinction events - patterns, processes and implications
Project 351: Early Paleozoic Evolution from the nucleus to the margins in Africa and South America

6. Accomplishments and products generated in 1994

(a) Circulation of the formal papers to Voting members for the postal ballot the boundary stratotype (GSSP) defining the base of the the Arenig (closing date for ballot 15 November 1994); based on the Ledge section, Cow Head Peninsula, western Newfoundland. This proposal is based mainly on the work of S.H. Williams, C.R. Barnes and W.B.N Berry.

(b) Members, including the Chairman and Secretary of the new Cambrian-Ordovician boundary Working Group, visited China in September 1994 to examine the GSSP candidate section at Dayangcha. A position paper is being prepared with details of the conodont biostratigraphy and taxonomy and sedimentology for circulation to members prior to a final series of ballots, hopefully in early 1995.

(c) Publication of two IUGS/GSA supported Ordovician correlation charts and explanatory notes for the areas of the Eastern European Platform & Tuva (*IUGS Publication* No.28) and the areas of Greenland & South Africa (*IUGS Publication* No.29).

(d) Completion of editing work on the final Ordovician correlation chart for China, hopefully to be published in early 1995 by IUGS/GSA (to complete publication of the Ordovician correlation chart series)

7. Problems encountered in 1994 (if any)

No major problems, though progress tends to be slow because most Subcommission work involving documentation of important boundary sections cannot be funded directly. Most leading funding agencies do not give high priority to pure stratigraphic research. This sort of research is commonly done as a by-product of other "trendy" research; indeed it essentially piggy-backs on other funding support from national bodies, and workers are unable to devote more than a small proportion of their time to this sort of research. Most

active Ordovician workers are very busy people and cannot devote more than a small proportion of their time to aspects of directed Subcommission work.

Also, the Ordovician has more than its share of problems for long-range correlation, particularly provincialism of faunas, and a lack of good, reliable radiometric and magnetostratigraphic data. Where available, it is not always possible to precisely integrate this physical data with the biostratigraphic record to establish a soundly based chronostratigraphic scheme.

8. Work plan for 1995

a. Operating budget request:

(i) Support to publish *Ordovician News* issue No.12 in early 1995 prior to the 7th International Symposium on the Ordovician System in June 1995.

(ii) General administrative expenses for the Subcomission Chairman & Secretary, and the C/O Working Group Chairman & Secretary.

b. Publications

(i) Guidebooks and an extended abstracts volume will be published as a part of the 7th International Symposium on the Ordovician System to be held in Las Vegas in June 1995 (see below).

(ii) A book entitled "Base of the *austrodentatus* Zone as a level for global subdivision of the Ordovician" (edited by Chen Xu and S.M. Bergstrom will be published in Nanjing late 1994 or early 1995 (as no.5 in the *Palaeoworld* Series)

(iii) Ordovician correlation chart and explanatory notes for China (edited by B.D.Webby) will hopefully be published by IUGS/GSA late 1994 or early 1995 (preceeding the Las Vegas Symposium to get good sales).

(iv) *Ordovician News* no. 12 will be assembled by S.H. Williams and published in early 1995 (also preceeding the Las Vegas meeting).

c. Conference

In June 1995 the 7th International Symposium on the Ordovician System will be held at the University of Nevada in Las Vegas, U.S.A. A full range of pre- and post-sessional excursions will accompany the meeeting, presentations (oral and poster) and opportunities for Subcommission (and Working Group) business meetings and workshops.

d. Anticipated accomplishments:

Main focus will be directly to delimiting the Ordovician subdivisions and defining GSSPs. This will hopefully include defining the Cambrian-Ordovician boundary, and the base of the Arenig. Also, it is hoped that we can adopt the base of *austrodentatus* (possible base of "Llanvirn") and possibly the base of *gracilis* (base of "Caradoc"), and to reach decisions on their use as either series or stage boundaries (or both).

It is expected that some decisions will be confirmed by postal ballot of the voting membership before the 7th International Symposium on the Ordovician System in Las Vegas in June 1995; others will follow discussions to be held at the Las Vegas meeting, with further postal ballots of voting members to confirm the decisions.

9. Potential funding sources outside IUGS

The Subcommission has no regular funding sources outside IUGS. Individual members of the executive, voting members and corresponding members will all need to find their own financial support through their institutions to attend the Las Vegas meeting. The Chairman who has now retired from teaching and administrative work at the University of Sydney but intends to remain active in Ordovician research will provide his own travel and expenses to attend the Las Vegas meeting.

10. Anticipated work plan for period 1996-99

1996. Submit various proposals for GSSPs and subdivisions ratified by the voting membership for ICS/IUGS approval before the 30th International Geological Congress to be held in Beijing, China. A strong program of Ordovician discussions is proposed for the stratigraphy session of the IGC, with focus on the Ordovician time scale and its subdivisions, and on patterns of Ordovician biodiversity. Also a pre-Congress field trip for Ordovician workers to the Tarim Basin of NW China is being organized by Chen Xu.

1997-99. One may expect that priority will continue to be given by the new (post 1996) Executive to defining all the boundary stratotypes for the stage and series subdivisions of the Ordovician System, and of publishing the decisions of all these final recommendations. The 8th Internatiional Symposium on the Ordovician System will be held either in Prague, Madrid or San Juan (Argentina); Argentinian workers have proposed the meeting be held in September 1998. There will undoubtedly be additional field meetings through intervening years to examine prime candidate sections for stratotype boundaries.

Barry Webby

ORDOVICIAN SUBCOMMISSION TITULAR MEMBERSHIP, MEETINGS AND PUBLICATIONS TO 1995

List of Voting Members of the Subcommission on Ordovician Stratigraphy: 1974-1996

Apollonov M.K. [Kazakhstan, trilobites] 1992-96
Baldis, B.A. [Argentina, stratigraphy] 1982-96
Barnes, C.R. [Canada, conodonts] 1977-96; Chairman 1982-90
Bergström, S.M. [U.S.A., conodonts] 1974-96; Secretary 1977-82
Berry W.B.N. [U.S.A., graptolites] 1974-96
Bruton, D.L. [Norway, trilobites] 1979-96
Chen Xu [China, graptolites] 1987-96; Vice Chairman 1992-96
Chugaeva M.N. [U.S.S.R., trilobites] 1984-85
Cooper, R.A. [New Zealand, graptolites] 1992-96; Chairman/Cambrian-Ordovician Working Group 1993-96
Dean, W.T. [United Kingdom, trilobites] 1974-96

Destombes M.J. [Morocco, stratigraphy] 1974-89
Finney, S.C. [U.S.A., graptolites] 1992-96
Fortey, R.A. [United Kingdom. trilobites] 1989-96
Gutierrez Marco, J.C. [Spain, graptolites] 1993-96
Ingham J.K. [United Kingdom, trilobites] 1977-92
Jaanusson V. [Sweden, shelly faunas] 1974-96
Kanygin, A.V. [U.S.S.R., stratigraphy] 1989-92
Kuo Hungchun [China, stratigraphy] 1978-89
Lu Yenhao [China, trilobites] 1978-92
Mannil, R. [U.S.S.R, chitinozoans] 1975-89; Vice Chairman 1980-84
Nikitin I.F. [U.S.S.R. & Kazakhstan, brachiopods] 1975-1996; Vice Chairman 1984-92
Obut, A.M. [U.S.S.R., graptolites] 1975-84
Owen, A.W. [United Kingdom, trilobites] 1992-96
Paris, F. [France, chitinozoans] 1989-96
Popov, L.E. [Russia, brachiopods] 1992-96
Robardet, M. [France, stratigraphy] 1974-1993; Vice Chairman 1977-80
Ross, R.J. Jr [U.S.A., shelly faunas] 1974-96; Chairman 1977-82; Secretary 1974-77
Sheng Shenfu [China, stratigraphy] 1978-89
Wang Xiaofeng [China, graptolites] 1987-96
Webby, B.D. [Australia, coral-sponge faunas] 1974-96; Chairman 1990-96; Secretary 1982-90
Williams, A. [United Kingdom, brachiopods] 1974-77; Chairman 1974-77
Williams, S.H. [Canada, graptolites] 1989-96; Secretary 1990-96
Whittington, H.B. [United Kingdom, trilobites] 1974-1989
Zhou Zhiyi [China, trilobites] 1992-1996

Official field (F) and business (B) meetings of the Subcommission and boundary working groups

1971 Combined Ordovician-Silurian Colloquium (1st International Symposium), Brest, France [Prior to the formation of International Subcommission & Working Groups]
1974 Inaugural Subcommission (SOS) & Working Group meetings (2nd International Symposium), Birmingham, United Kingdom (F/B)
1976 Subcommission (SOS) meeting (IGC) Sydney, Australia (B)
1977 Subcommission (SOS) meeting (3rd International Symposium), Columbus, Ohio (F/B); Ordovician/Silurian WG, Kazakhstan (F)
1978 Subcommission (SOS) Field trip, China (F); Cambrian-Ordovician WG, Wales (F)
1979 Ordovician-Silurian Boundary WG, United Kingdom (F)
1980 Subcommission (SOS) meeting (IGC) Paris, France (B)
1981 Ordovician-Silurian WG, Anticosti Island (F)
1982 Subcommission (SOS) & WG meetings (4th International Symposium) Oslo, Norway (F/B)
1983 Cambrian-Ordovician & Ordovician-Silurian WGs, China (F/B)
1984 Subcommission (SOS) & last Ordovician-Silurian meetings (IGC) Moscow, USSR (F/B)
1985 Cambrian-Ordovician WG, Calgary, Canada (F/B)
1986 Cambrian-Ordovician WG, Dayangcha, China (F)
1988 Subcommission (SOS) & Cambrian-Ordovician WG meetings (5th International Symposium) St John's, Newfoundland (F/B)
1989 Subcommission (SOS) meeting (IGC) Washington, DC, USA (B)
1990 Field meeting, Tallinn, Estonia (F/B) - joint with Silurian specialists)
1991 Subcommission (SOS) & Cambrian-Ordovician WG meetings (6th International Symposium) Sydney, Australia (F/B)
1992 Cambrian-Ordovician WG Field meeting I, Dayangcha, China (F)
1993 Subcommission (SOS) Field meeting, Nanjing, China (F/B)
1994 Cambrian-Ordovician WG Field meeting II, Dayangcha, China (F)
1995 Subcommission (SOS) & Cambrian-Ordovician WG meetings (7th International Symposium), Las Vegas, USA (F/B)
1996 (projected) Subcommission (SOS) meeting (IGC) Beijing, China (F/B)

Publications related to Subcommission work and availability

A. *Ordovician correlation charts (IUGS Publication Series)*

[Unless otherwise stated, these volumes are available from the IUGS Secretariat, c/o Geological Survey of Norway, PO Box 3006 Lade, N-7002 Trondheim, Norway (Fax +47 3921620). Postage & handling is extra]

The Ordovician System in China. Correlation Chart & Explanatory Notes, 7 p., Shen Shenfu, 1980. ($6.00)

The Ordovician System in the Near and Middle East. Correlation Chart & Explanatory Notes, 22 p., W.T. Dean, 1980. ($6.00)

The Ordovician System in Australia, New Zealand and Antarctica Correlation Chart & Explanatory Notes, 64 p., B.D. Webby *et al.*, 1981. , ($6.00)

The Ordovician System in Canada. Correlation Chart & Explanatory Notes, 27 p., C.R. Barnes, B.S. Norford & D. Skevington, 1981. ($6.00)

The Ordovician System in Southwestern Europe (France, Spanin and Portugal) Correlation Chart & Explanatory Notes, 47 p. W. Hamman, M. Robardet and M. Romano, 1982. ($7.50)

The Ordovician System in the United States Correlation Chart & Explanatory Notes, 73 p., R.J. Ross, Jr *et al.*, 1982. ($10.00)

The Ordovician System in Kazakhstan and Middle Asia. Correlation Chart & Explanatory Notes, 34 p., I.F. Nikitin *et al.*, 1986. ($7.50)

The Ordovician System of South America. Correlation Chart & Explanatory Notes, 72 p., F.G. Acenolaza & B.A. Baldis, 1986.

The Ordovician System in most of Russian Asia. Correlation Chart & Explanatory Notes,

115 p., R.J. Ross Jr, & J. Talent (eds) 1990. ($18.00)

The Ordovician System of the East European Platform and Tuva (Southeastern Russia). Correlation Chart & Explanatory Notes,61 p., B.D. Webby, R.J. Ross Jr, & Y.Y. Zhen (eds.), 1994. ($40.00 from GSA Publications PO Box 9140, Boulder CO 80301 USA)

The Ordovician System in Greenland and South Africa. Correlation Charts & Explanatory Notes, 60 p., S.H. Williams (ed.), 1994. ($40.00 from GSA Publications PO Box 9140, Boulder CO 80301 USA)

Correlation of the Ordovician Rocks of China. Charts & Explanatory Notes, Chen Xu *et al.*, in press, 1995. (price yet to be announced)

B. *Other publications - Ordovician Symposium Proceedings and Relevant C/O and O/S Boundary Working Group volumes*:

Barnes, C.R. & Williams S.H. (eds), 1991, Advances in Ordovician Geology. *Geological Survey of Canada, Paper* **90-9**, 336 p. (Available from the Geological Survey of Canada, 601 Booth Street, Ottawa Canada, K1A 0E8)

Bassett, M. G. (ed.), 1976. *The Ordovician System; Proceedings of a Palaeontological Association Symposium, Birmingham, September 1974*. Univ. of Wales Press & National Museum of Wales Press, Cardiff, 696 p.

Bassett, M.G. & Dean, W.T. (eds), 1982. The Cambrian-Ordovician Boundary: Sections, Fossil Distributions, and Correlations. *National Museum of Wales, Geological Series*, **3**, 227 p., Cardiff. (Available from the National Museum of Wales, Cathays Park, Cardiff, CF1 3NP, UK)

Bruton, D.L. (ed.), 1984. Aspects of the Ordovician System. *Palaeontological Contributions from the University of Oslo*, **295**, Universitetsforlaget, Oslo, 228 p. (Available from Universitetsforlaget, Oslo, Norway)

Cocks, L.R.M. & Rickards, R.B. (eds), 1988. A Global Analysis of the Ordovician-Silurian boundary. *Bulletin of the British Museum (Natural History) (Geology)* **43**, 394 p. London (Available from Publication Sales, BM (N.H.) Cromwell Road, London SW7 5BD, UK)

Harland W,B., *et al.*, (eds.) 1988. Cambrian-Ordovician Boundary Issue. *Geological Magazine*, **125** (4) 323-463. (Cambridge University Press, UK)

Webby, B.D. & Laurie J.R.(eds), 1992, *Global Perspectives on Ordovician Geology*. A.A. Balkema, Rotterdam, 513 p. (Available from A.A. Balkema Publishers, P.O. Box 1675, BR Rotterdam, Netherlands. $95.00)

Barry Webby

CHANGES IN MEMBERSHIP

We are pleased to annonounce that Drs. Aidar Zhylkaidarov (Kazakhstan) and Ian Percival (Australia) have accepted invitations to become Corresponding Members of the Ordovician Subcommission. Aidar's expertise is in the field of Ordovician conodonts,

particularly those preserved in siliceous material, while Ian is well known for his studies on Ordovician brachiopods (see "Current Research"). The terms of office of Barry Webby (Chairperson) and Henry Williams (Secretary) end at IGC in 1996. A nominating committee has been struck, chaired by Stig Bergström.

TOWARDS GLOBAL ORDOVICIAN SUBDIVISIONS

I included a discussion in the last issue of Ordovician News outlining several possible ways in which the Subcommission could proceed with global chronostratigraphic subdivisions in light of recommendations made by the International Commission on Stratigraphy (ICS). So far I have only received feedback from a couple of members; these issues are very important, so I ask for more comments before our meeting in Las Vegas, particularly concerning whether we should be concentrating on global series or stages. Please send your comments by mail or e-mail (note my new addresses, given on p. 1)

Barry Webby

CAMBRIAN-ORDOVICIAN BOUNDARY WORKING GROUP - PROGRESS REPORT

As outlined in the last Ordovician News, the newly reconstituted COBWG has defined its immediate goals and work programme. These are to properly document the Dayangcha candidate section in North China preparatory to voting on its suitability as a global stratotype (GSSP). An initial letter to all on the circulation list outlining this intention was distributed in February 1994 and was followed by a Circular sent out in June 1994 which suggested an appropriate basis from which to commence the new phase of investigation and also brought members up to date with work on the conodont faunas. A summary of a report on the sedimentology of the section by Maurits Lindström was included; this report, based on a 1:2 scale log of the section, concluded that there is no sedimentological evidence for a stratigraphic break in the section in the boundary interval.

A second Circular was sent out in March and reports on a vist to the Dayangcha section by Godfrey Nowlan, Bob Nicoll and Roger Cooper in September 1994. Further progress on the conodont work by Nicoll and Nowlan is presented together with a report on a re-examination of the graptolite faunas by Cooper. Correspondence with Rob Ripperdan on the important question of the significance of the magnetostratigraphy and isotope stratigraphy of the Dayangcha section, especially as it concerns the interpretation of the completeness of the section, is included in an appendix. COBWG members are urged to read this material carefully (together with the original paper) and give us (the Executive) their views on its implications.

Projects under way are firstly, to define in detail the stratigraphic ranges of conodont taxa in the boundary interval in order to provide the greatest possible number of useable biohorizons for testing against the possibility of breaks in the section and for precise correlation. The initial results of this work, given in the forthcoming Circular, are

encouraging. The results considerably amplify, and generally support, the earlier work of Chen Junyuan and his colleagues. Secondly, a suitable fossil must be found for use in defining the horizon in the section at which to place the boundary. Whereas all available means will be used to correlate the boundary level with other sections, including biostratigraphy, isotope stratgraphy, sequence stratigraphy etc. the Working Group has previously decided to base the boundary on the first appearance of a species of conodont, at a level close to the base of the Tremadoc series. The originally chosen species, *Cordylodus lindstromi*, has proved to be too problematic and a new species is needed. The most suitable replacement appears to be the earliest species of *Iapetognathus*. The taxonomy of *Iapetognathus* needs to be established and it is planned to do this by cooperation with other conodont workers around the world. In the Dayangcha section *Iapetognathus* first appears at the same level as *C. lindstromi* ss and very close to the first appearance of planktic graptolites in the section, and therefore readily enables correlation into the graptolite facies around the world. Thirdly, a re-examination of the graptolite faunas has revealed that revision of all taxa described from the section by Lin Yaokun is needed. There is however, little doubt that the lowest graptolite horizon is close to the FAD of planktic graptolites, the important point so far as boundary definition is concerned.

The next step will be to produce a position paper on the Dayangcha section. This will outline the results of all investigations to date, summarise their interpretation and significance and, hopefully, provide members with enough information to make a decision on the Dayangcha section. But before the position paper can be completed, the taxonomy of *Iapetognathus* must first be described. Our conodont workers are critical to progress! Results of the current investigations will be summarised at the Ordovician Symposium in Las Vegas in June.

Roger Cooper, Chairman
Godfrey Nowlan, Secretary

TREMADOC-ARENIG BOUNDARY PROPOSAL

A postal ballot was held early in 1992, and approved the base of the *approximatus* graptolite zone as the base of the second series of the Ordovician System (i.e., approximating to the level close to the base of the British Arenig Series).

A second postal ballot in late 1994 proposed the first appearance of *Tetragraptus approximatus approximatus* as defining a boundary stratotype and base of the Arenig in the Ledge section at the westernmost end of the Cow Head Peninsula, Newfoundland. However, the vote has been postponed because no clear majority was achieved, and a number of issues were raised during the voting process which require further consideration. These comprise: (1) that the vote was not clearly specified as defining a Series, or a Stage, boundary; (2) that the British name (Arenig) had been used rather than a less committed interim terminology, such as "second series"; (3) that there had been inadequate review of all potentially good sections across the particular interval (in particular the Hunneberg

sections in southern Sweden needed to be further evaluated), and (4) some members raised serious concerns about stratigraphic continuity through the critical interval in the Ledge section at Cow Head. Further work is now required on the Ledge section, Newfoundland, and on new sections in the Hunneberg region of southern Sweden, as a basis for reinstating the postal ballot. This topic will be discussed in detail at the meeting in Las Vegas.

[n.b. We received a number of detailed responses regarding the proposal and voting proceedures; there is insufficient space to reproduce all of these here, but we would encourage these authors either to bring along copies to the discussion meeting in June, or to ensure that either myself or Henry Williams has authorisation to copy and circulate discussions sent to us previously]

Barry Webby

FRANCINE MARTIN, 1937-1994 - IN MEMORIAM

It is with great regret that we report the death, on December 16, 1994, of Francine Martin, one of the leaders of acritarch and chitinozoan research.

At twenty years old, Francine finished her studies in Biology at the Université Libre de Bruxelles in 1958. She first worked several years as a public secondary school teacher before starting her scientific research at the Department of Palaeobotany of the Institut Royal des Sciences Naturelles ce Belgique (I.R.S.N.B.) at Brussels in 1964. Under the supervision of Prof. F. Stockmans, in 1968 she presented her Ph.D. thesis on the Ordovician and Silurian acritarchs of Belgium. Francine obtained her position as a micropalaeontologist-palaeobotanist at the I.R.S.N.B. in 1971, where she started her work by building up the palynological department.

Her detailed studies on the systematics and the biostratigraphy of acritarchs and chitinozoans of the Cambrian, Ordovician, Silurian, and Devonian systems made her to one of the foremost workers on Lower Palaeozoic palynomorphs of the last 25 years. The international value of Francine's work is evident. After her studies on Belgian sections, she investigated material from areas all around the world: Argentina, Australia, Canada, China, France, Norway, England and Wales, Turkey; just to name a few. She was Corresponding Member of the Subcommissions on Cambrian, Ordovician, and Silurian Stratigraphy. She was a Titular Member of the Silurian Subcommission (1974-1992), and its Secretary between 1974 and 1984.

The results of Francine's investigation on Ordovician material are published in nearly 30 papers. Her first scientific articles were on the Ordovician acritarchs and chitinozoa from Belgium, followed by investigations on the Early Ordovician of the Montagne Noire, southern France. Her investigations in Canada started with the description of some chitinozoans in 1975. Numerous papers on Cambrian and Ordovician acritarchs and Ordovician chitinozoans from several other Canadian sections of Alberta, Newfoundland, Ontario, Québec followed. More recently, Francine investigated also Ordovician acritarchs from North China and Turkey.

To all who knew her, Francine was a very engaged, critical and inventive scientist. She will be remembered, not only for her outstanding contribution to acritarch and chitinozoan research, but also for her help to students and colleagues. There were many of us who made the "pilgrimage" to Brussels, and Francine always offered us a look to her slides and valuable advices. Much of her expertise and knowledge is exemplified in the 63 pages of one of her last and most important papers: "Acritarchs: a review".

Selected bibliography on Ordovician biostratigraphy

Martin, F. 1969. Les acritarches de l'Ordovicien et du Silurien belges. *Mémoires de l'Institut royal des Sciences naturelles de Belgique*, **160**, pp. 1-175. (cover date 1968).

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Thomas Servais and Marco Tongiorgi

FUTURE MEETINGS:

7th International Symposium on the Ordovician System, June 1995

More that 100 participants have registered; more than 120 short papers/abstracts have been submitted for the proceedings volume. The papers and abstracts were reviewed and returned to authors in early March for revision and preparation of camera-ready copy that must be in the editors hands by April 15 if they are to be included in the proceedings volume. Papers on chronostratigraphy (stages, series, their boundaries) and the C/O boundary will be in sessions on Monday and Tuesday (June 12 and 13) with meetings of the COBWG and Ordovician Subcommission scheduled for Monday and Tuesday evenings. A final formal business meeting of Ordovician Subcommission will be held on

Friday (June 16). All field trips are well subscribed, These are still places for those still wishing to attend. Only a few places remain for the Symposium banquet. Those who still wish to attend should reserve a place as soon as possible. The banquet cruise ship can hold no more than 75. All those who have registered will be sent a Third Circular with arrival instructions and a tentative copy of the program in early May.

Plans are also progressing for the Graptolite Conference. Approximately 30 have registered and approximately 40 papers and three workshops will be held over three days. Both field trips will go.

Stan Finney

North American Paleontological Convention, June 1996

John Repetski is trying to ensure that the program for the June 1996 North American Paleontological Convention, in Washington D.C., is attractive to lots of fellow Ordovician workers! Anyone still needing a copy of the First Circular, or wishing to propose a symposium or theme session, please write or fax him.

John Repetski

3rd Baltic Stratigraphic Conference, October 1996

The Baltic Stratigraphical Association, uniting the corresponding commissions of Estonia, Latvia and Lithuania, has been regularly organizing joint meetings devoted to regional stratigraphy. The first true international conference took place in 1993 in Vilnius. The second one will be held in Tallinn, Estonia from 8 to 11 October 1996. The main topic of the conference is high resolution biostratigraphy and Baltic regional stratigraphy. The organizing committee asks for expressions of interest before 1 July 1995. Please give a preliminary title of your paper (if any) and whether you are interested in a short (1-2 days) early Paleozoic excursion in northern Estonia. The excursion will take place if there is a sufficient number of registrants. At present, one night in a hotel at the conference venue costs USD 20-40 (breakfest included), but inflation may increase this figure by 20-30%. More information will be given in the second circular, with planned distribution before December 1995. Alternatively, contact: D. Kaljo, Institute of Geology, 7 Estonia Ave., EE0100 Tallinn Estonia. (fax: 372 6 312074, e-mail kaljo@p[illegible]geol.gi.ee).

Dimitri Kaljo

REPORTS:

Friends of the Ordovician

Following the usual round of personal introductions and brief summaries of activities with respect to Ordovician matters on the part of each person, the balance of the meeting was devoted to a discussion of the status of preparations for the International Symposium on the Ordovician System to be convened in June of 1995 in Las Vegas. Stan Finney, representing the organizing committee, reported that interest in participation has been

good. Guidebooks for the field trips are being prepared, and manuscripts of short articles are to be in the hands of the editors soon after the start of 1995. At the conclusion of the meeting, Walter Sweet was congratulated by the group on being awarded the Paleontological Society Medal earlier in the day.

Ray Ethington

"Ordovician of the Prague Basin" Working Group

List and systematics of all paleontological informations (faunistic and floristic taxa) established in the Ordovician of the Prague Basin have been updated, with precise ranges for stratigraphically significant taxa specified. Several localities exposing boundaries between individual stages and/or covering chronological equivalents of key biozone levels have been selected for detailed investigation. Results of the working group to date will be presented in Las Vegas. Convenors for stages have been established: Tremadoc - M. Mergl; Arenig to Dobrotivian - J. and P. Kraft; Berounian - R. Mikulas; Kralodvorian to Kosovian - P. Storch.

Working Group on the Ordovician Geology of Baltoscandia: WOGOGOB-94 Meeting

WOGOGOB was initiated in the 1980's and the first meeting was held with an attendance of about 20 scientists from the Baltoscandian Region. The organization is informal and the goal is primarily to stimulate and create a platform for research on the Ordovician of Northern Europe. Since the first meeting, WOGOGOB workshops have been arranged approximately every second year with Sweden, Estonia, Norway and now Denmark as host.

The WOGOGOB-94 workshop took place between the 29th August and 4th September 1994 at Hotel Solgaarden on the island of Bornholm, Denmark. The WOGOGOB-94 participants met on August 29, 1994 in the afternoon. The meeting was well attended and more than 50 persons participated in the meeting and in the post-meeting fieldtrips; scientists from the Baltoscandian countries as well as visitors from abroad were present. The theme of the meeting was "The significance of gaps" but the programme also included oral presentations and poster sessions dealing with broad aspects of Ordovician geology. A number of these presentations will be published in a special volume of the Danish Geological Survey Series.

Two plenary sessions were arranged; one on the Varangu problem (promotor B.-D. Erdtmann) and another on the Regional Chronological Divisions related to the (proposed) global Chronological Division (promotor N. Spjaeldnaes).

Following the formal technical session the official workshop dinner was held in a relaxed atmosphere; spontaneous cabaret was enthusiastically recieved, particular the performances of David "Swing low" Bruton and Jan "Two candles on the table" Rasmussen. The technical session was followed by excursions to the Ordovician sections on Bornholm and Scania, Sweden (guided by A.T. Nielsen) and to Öland, Sweden (guided by S.Stouge). Together, these excursions presented a transect from the stable platform

deposits to the oceanward deeper shelf sediments of Baltica. The final stop of the field trip was Copenhagen in Denmark.

The meeting was financially supported by the Danish Research Council (SNF) which permitted the organizer to cover expenses for several participants from Baltic countries, Poland and Russia. I. Puura, Estonia and F. Feilberg, Denmark assisted with many aspects before and after the meeting.

The next WOGOGOB meeting will be organized by Tanja Koren (St. Petersburg, Russia), probably in about two years time.

Svend Stouge

TYPE COLLECTIONS AT THE ROYAL ONTARIO MUSEUM

The holdings at the Royal Ontario Museum Department of Invertebrate Palaeontology comprise an eclectic collection of wide stratigraphic and geographic provenance representing all major taxonomic groups. About 18% of the catalogued and accessioned collections are of Ordovician age, predominantly from Canada and the USA. These include about 8250 catalogued specimens or lots, of which about 1450 are type or figured specimens (Type Collection), and over 300 accessioned lots of Ordovician fossils containing from a single specimen to several crates of material. Both catalogued and accessioned collections are now largely computerized on the PARIS system of the Canadian Heritage Information Network (CHIN), which makes it relatively simple to retrieve information on our holdings using a number of different search parameters. Enquiries about the collections are welcome.

Material for study may be borrowed by professionals at recognized institutions. Loans to students are made through their supervisor and the supervisor is recorded as the borrower. The usual term of a loan is six months, but longer loans may be arranged, especially for unprepared material, or in cases where safe transportation of the material necessitates a delay. For type and figured material every attempt is made to have the material hand-delivered both ways. If this is not possible, then the most reliable carrier is used (usually courier or first class registered mail). Delicate or damaged material and extremely heavy specimens or large collections are not loaned. Visitors to the collections are welcome by prior arrangement.

Holdings in the Type Collection have quadrupled since our last type catalogue was published in 1978. A complete, updated list is now available from me at: Department of Invertebrate Palaeontology, Royal Ontario Museum, 100 Queen's Park, Toronto, Ontario, Canada M5S 2C6 [Tel. (416) 586-5593; Fax (416) 586-5863; E-mail janetw@rom.on.ca].

Janet Waddington

HOT OFF THE PRESS!

Graptolite Research Today

Copies of *Graptolite Research Today* are still available (25 US dollars for each, air postage included). Please contact Chen Xu. Cheques and money orders are accepted.

New publications on Newfoundland geology

Over the past few decades, the Lower Paleozoic geology of Newfoundland has received worldwide attention due to its invaluable contribution to the understanding of Ordovician stratigraphy and paleogeography. Two new publications have just been produced which include summaries of both the geology and paleontology. The first is "A *Traveller's Guide to the Geology of Newfoundland and Labrador*", published by the Newfoundland Section of the Geological Association of Canada. In addition to geological maps of Newfoundland and Labrador, it includes inset boxes covering topics such as geological processes and economic geology and comes complete with a guidebook describing geological stops. While aimed primarily at the non-specialist, many earth scientists will find it of use either for teaching or as a summary for touring. It is available from the Geological Association of Canada Publications Department, at the same address as Henry Williams (see p. 1); the cost per copy is $13.00 (Canadian or US), which includes tax, postage and handling.

The second publication is a summary by Doug Boyce and Henry Williams (see 1994 references) on "*One and a half centuries of paleontological research: a selective bibliography of Newfoundland and Labrador fossils*". It has been published by the Newfoundland Department of Natural Resources as part of their Current Research Report. The 22 page bibliography is arranged roughly by tectonostratigraphic zones for the province. The authors have not attempted to summarize details of fossil groups or geological periods; it is hoped that much of this will be self evident from the titles of articles, although such a feature would be useful and perhaps this could be added in the future. While it is intended to be relatively exhaustive, we will naturally have missed some relevant works and would encourage feedback. We realize that this publication will not be widely available outside Canada; anyone who would like a reprint should, therefore, contact Henry Williams (address on p. 1). Those who would prefer a copy of the bibliography in electonic form are encouraged to contact either Doug Boyce or Henry Williams (wdb@zeppo.geosurv.gov.nf.ca or williams@sparky2.esd.mun.ca); we are able to supply it as a word processing document (*e.g.*, Word Perfect, Word) for Macintosh, Atari or MS-DOS (send 3.5" disk), or alternatively could be sent as a compressed file via e-mail.

Henry Williams

ATLAS OF GRAPTOLITE TYPE SPECIMENS

The British and Irish Graptolite Group has been putting together an "Atlas of Graptolite Type Specimens". Most graptolite workers should already have been contacted,

but if anyone has been missed, or if there is anyone else that would be interested in contributring to the project, we would be pleased to hear from them.

The idea behind the Atlas is to produce a collection of detailed drawings of type material that will help clarify taxonomic usage. Despite remaining indispensible, the monograph by Elles & Wood is now very out of date. Many of the species have been revised, and a considerably refined biostratigraphic framework is now available. Unfortunately it is now impossible to write a "revised monograph", even for one country. The volume of work is too much for one person, or even a group of people, although there remains a need to synthesise information on graptolite species within a unitary system. The Atlas will consist of simple, annotated line drawings of type material of Ordovician and Silurian graptolite species. It is not meant as a replacement for more detailed descriptions; rather, it is meant to gather together reference information on all graptolite species in a standard format and may also be useful as a "working handbook" for quick identification and comparison. As material is collected, it is planned to publish it in folios of 100. The format is to be A4 and loose-leaf; loose-leaf to allow for the arrangement of the drawings according to individual biostratigraphic or phylogenetic tastes.

It is hoped that the Atlas will not only comprise paper copy, but will also be produced as part of a larger electronic database on graptolites, perhaps combined with information on stratigraphic ranges and graptolite reference papers. Refinement of taxonomic knowledge should increase the precision of biostratigraphic dating using graptolites and permit the construction of more reliable evolutionary lineages

We have collected and annotated nearly 100 graptolite drawings so far produced by ourselves and colleagues. Thus, the first folio is nearly there. A list of the graptolites drawn so far is available to anyone interested. Any correspondence/data is best directed to Jan Zalasiewicz or Sue Rigby, Department of Geology, University of Leicester, University Rd., Leicester LE1 7RH, UK.

Jan Zalasiewicz

NEWS AND CURRENT RESEARCH OF ORDOVICIAN WORKERS

PER AHLBERG (Sweden) is studying telephinid trilobites from the Ordovician of Baltoscandia. Two publications dealing with these peculiar trilobites are in press (*Palaeontology* and *GFF*). **Kristina Månsson**, one of his research students, has been working on trilobites from the Middle Ordovician Killeröd Formation of Scania, southern Sweden, and a manuscript has been submitted to *GFF*. She will continue to work on Middle Ordovician trilobites and stratigraphy in the Lower Allochthon of the central Scandinavian Caledonides in Jämtland, Sweden.

DICK ALDRIDGE (UK) reports that three field visits to the Soom Shale Conservation Lagerstätte in South Africa in the last two years have continued to produce exciting results. The project is collaborative with **Hannes Theron** (South Africa) and **Sarah**

Gabbott (UK), and also involves various other specialists on relevant aspects. Recent finds include soft-bodied problematica, more eurypterids with preserved soft tissues, encrusted orthocones, and a giant conodont animal. The unusual mode of preservation of the soft tissues is also of considerable interest. Watch out for several papers on the Soom Shale and its biota in 1995.

CHRIS BARNES (Canada) continues field studies of Ordovician sequences in the Canadian Cordillera. In 1994, conodont samples were collected from the Kechika Formation and Road River Group of northernmost British Columbia. **Annalisa Ferretti** (Italy) completed a post-doctoral fellowship at UVic and joint papers have been submitted on Ashgill conodonts from the Kalkbank Formation of Germany and for the Ashgill sequence at Whitland, Wales. Detailed study of Lower-Middle Ordovician conodonts from the Wilcox Pass section in Alberta continues with **Zailiang Ji**; a paper on the faunas from the Survey Peak Formation has been submitted. Ongoing work on Cordillera conodonts continues with **Lee McKenzie-McAnally** (Ph.D.) and **Leanne Pyle** (M.Sc.); with Ordovician conodonts from central China with **Jianqin Chen** (Ph.D.). Geochemical work on conodonts is close to completion involving strontium isotopes (with **Jan Veizer**, Ottawa/Bochum) and neodymium isotopes (with **Cindy Wright** (M.Sc.) and **Stein Jacobsen** (US)). A synthesis paper on Ordovician global bioevents will appear in 1995 (with **Richard Fortey** and **Henry Williams**) in the proceedings volume for IGCP Project 216. A sabbatical leave in 1995-96 will help the completion on several other projects.

MICHAEL BASSETT (UK) is currently working mostly on revisions of orthid, dalmanellid and craniid brachiopods for the revised edition of the brachiopod volume of the *Treatise on Invertebrate Paleontology*. Ongoing work on Ordovician brachiopods includes studies of Caradoc/Ashgill faunas from central Sweden and the northern Oslo region of Norway, and on Arenig faunas from Wales. He is also working with **Norman Savage** (USA) on Llandeilo/Caradoc conodonts from South Wales. He has a Ph.D. student in Cardiff (**Mark Sutton**) working on Tremadoc to Llandeilo age phosphatic brachiopods (lingulates), including micromorphic taxa, from Wales and the Welsh Borderland.

JUAN BENEDETTO (Argentina) is working on possible stratotypes for the Ordovician of the Precordillera and with conodonts and graptolites zones.

STIG BERGSTRÖM (US) records that active projects during 1994 include: The base of the Upper Ordovician *A. ordovicicus* Zone as a global reference level; Relations between conodont and graptolite zones in the Upper Ordovician of the North American Midcontinent (with **Dan Goldman**); Conodonts from the Svartsaeter Limestone in the central Caledonides in Norway (with **David Bruton** and **Robert Neuman**); The base of the *U. austrodentatus* Zone as a global reference level (with **Chen Xu, Chuck Mitchell**

and others); Global correlation of the base of the North American Whiterockian Series; Lower to Upper Ordovician conodont biostratigraphy in the Siljan area, Sweden (with **Anita Löfgren**); The base of the *T. approximatus* Zone at Hunneberg, Sweden as a global stratotype of the base of the second series in the Ordovician System (with **Jorg Maletz** and **Anita Löfgren**); The significance of Ordovician K-bentonites in Europe, North America, and South America (with **Warren Huff, Dennis Kolata**, and **Carlos Cingolani**); and Middle Ordovician stage classification in North America (with **S. Leslie**).

PAT BRENCHLEY (UK) continues to work on stable isotopes as evidence of Ordovician climatic and oceanographic change. Work also continues on the taphonomy of Ordovician-Silurian shell beds.

RAINER BROCKE (Germany) is continuing his studies on Ordovician acritarchs from the Yangtze Platform, China. Several papers about acritarch taxonomy are in press or in the state of final preparation: a revision of *Ampullula* and related taxa; a revision of the genus *Arbusculidiu* with **Oldrich Fatka** (Czech Republic); work on the genera *Dicrodiacrodium* and the *Aureotesta-Marrocanium* complex with **Oldrich Fatka, Thomas Servais** (Belgium). A revision of *Pirea* is planned together with Oldrich, Thomas and **Ivo Paalits** (Tartu, Estonia and TU Berlin).

CHEN XU (China) is working on a number of projects. He will be submitting *A Correlation of Ordovician Rocks of China* with co-authors **Rong Jia-yu, Wang Xiao-feng, Wang Zhi-hao, Zhang Zhi-yi, Chen Ting-en, Geng Liang-yu, Deng Zhan-qiu, Hu Zhao-xun, Dong De-yuan** and **Li Jun**. This is edited by **Barry Webby** and has been submitted to IUGS publications and Geological Society of America. Another paper to be published on the base of the *austrodentatus* Zone as a level for global subdivision of the Ordovician with co-authors **Wang Zhi-hao, Zhang Yuan-dong, Stig Bergström, Chuck Mitchell, D. Winston**, and **Warren Huff** has been published in *Palaeoworld*, an English publication of the Laboratory of Palaeobiology and Stratigraphy, Nanjing Institute of Geology and Palaeontology, Academia Sinica. A paper on the Ordovician Historical Geology of China will be a chapter of a book in english on the *Biostratigraphy of China* edited by **Zhang Wen-tang** and to be published by Science Press, Beijing in 1995. Chen Xu is working on the Phanerozoic climatology of China with **Chen Pei-ji, Art Boucot, Ran Yi-ping, Liu Fu-jun, Wang Zhong-zhe, Zhang Yuan-dong, Li Gang, Chiyu Huang** (Taiwan) and **Koayan Wei** (Taiwan). Another project he is working on is the Ordovician and Silurian graptolites from Tarim with **Ni Yu-nan, Xiao Xin-dong**, and **Wang Pu**.

ROBIN COCKS (UK) is nearing completion of work on the Plectambonitoidea and Stophomenoidea for the Brachiopod Treatise. This will be followed later in the year by review work on Lower Palaeozoic brachiopod communities for the Brachiopod

Symposium at Sudbury, Ontario in autumn 1995.

TONY COOPER (UK) has moved to BGS in Keyworth, Nottingham, UK, following the closure of the BGS Newcastle office. He has completed his commitment to the survey of the Skiddaw Group (early Ordovician) of the English Lake District for which 1:10,000 scale maps have been prepared. The work has been partly written up by the Lake District team as a stratigraphy paper, which is in press. A descriptive memoir is in progress with **Adrian Ruston, Stewart Molyneux** and **Phil Stone.**

MARY DROSER (US) continues her work on Great Basin Ordovician strata along several avenues of research. She and **Richard Fortey** (UK) continue their work on the paleontology of the low to mid-Ordovician transition in the Great Basin. They have refined the middle Ordovician biostratigraphy based on new trilobites. Mary's student, **Xing Li**, is nearly finished his dissertation on Ordovician shell beds from the Great Basin. She has two other students who are working on the paleontology and paleoeecology of the Ordovician of the White Inyo Mountains, California (The Al Rose Formation and the Barrell Springs Formation). Mary continues her work with **Pete Sadler** on new methods of graphical correlation using the Ordovician of the Great Basin as a test, and with **Peter Sheehan** is in the early stages of a study using comparative paleoecology to examine family-level paleoecological changes associated with the Ordovician radiation.

BOB ELIAS (Canada) is studying Late Ordovician environmental cycles in North America, their potential for correlation, and their influence on coral biogeography, evolution, and extinction. Other research, with **Graham Young**, focuses on coral faunas during the Ordovician-Silurian mass extinction and recovery. Doctoral student **Adam Melzak** is working on rugose corals from the Upper Ordovician to lowermost Silurian of Anticosti Island, Quebec.

BERND ERDTMANN (Germany) continues his graptolite-stratigraphy and basin analysis in the Eastern Cordillera of southern Bolivia and northern Argentina. During the field season in July 1994 numerous new graptolite horizons were discovered in the Tarija, Culpina and Tupiza regions, including the first occurrences of *Paratetragraptus approximatus* and *Pendeograptus fruticosus* in Bolivia. A ca. 700m thick continuous section rich in graptolites was measured near Cieneguillas which ranges between the FADs of *Araneograptus murrayi* and *P. approximatus*, i.e. fully documenting the "Lower Hunneberg Interval" (LHI). The base of this sequence is formed by a tempestitic interval which is interpreted to reflect emergence of the rather tranquil Tremadoc Cieneguillas Fm. and of the superjacent transgressive Obispo Fm. subsiding to a level below stormwave base again. This interval which is traceable for hundreds of kms along strike in the Cordillera Oriental may be related to the globally effective "Ceratopyge Regressive Event" (CRE).

Additional Ordovician projects are running in the Baltic region of Estonia ("Varangu

Project") together with **Ivo Paalits** (acritarchs) and **Oliv Vinn** (graptolites). A full detailed analysis of both graptolite facies and carbonate (conodont) facies of the Baltoscandian Tremadoc and Lower Arenig is at the planning stage and will be conducted in cooperation with Tallinn (Eston. Acad. Sci.) and Tartu University and with the Universities of Oslo, Lund, Copenhagen, Riga, Vilnius and St. Petersburg.

The German "Subcommission on Stratigraphy of the Riphaean to Silurian" organized a field trip last summer (1994) to the Cambro-Ordovician of the Schwarzburg Anticlinorium of Thuringia and is currently compiling a "stratigraphic lexicon" on the Early Paleozoic lithostratigraphic units of Germany to be published (unfortunately) in German during 1995.

OLDRICH FATKA (Czech Republic) is continuing studies on Lower Ordovician acritarchs and partly also of chitinozoans from Bohemia. Together with **Rainer Brocke** (Germany), **Thomas Servais** (Belgium) and **Stewart Molyneux** (UK) selected acritarch taxa are being revised.

ROBERT FREY (USA) continues his research on Ordovician nautiloids on a part-time basis at Ohio State University. He is working on a systematic study of Ordovician nautiloids from southeastern British Columbia for the Geological Survey of Canada. As part of the same project, with **Brian Norford** (Canada), he prepared a summary paper for presentation at the Ordovician Symposium in June. He is still processing material "acquired" by **Rousseau Flower**, concentrating on nautiloids from the St. George Group in Newfoundland, the El Paso Group in Texas-New Mexico, and the Platteville Group in Wisconsin and Illinois (with **John Catalani**) and hopes to have these faunas written up by the end of the decade. USGS Professional Paper 1066P on Ordovician nautiloids of the Cincinnati Arch region should be out sometime this year.

YNGVE GRAHN (Sweden) is working together with **Jaak Nõlvak** (Estonia) on the effects of a climatic change in Baltoscandia during Caradoc. Also the effects of asteroid impacts on the marine faunas will be studied.

THOMAS HEUSE (Germany) has finished micropaleontological investigations in the Variscian Belt Zone of Germany (Schwarzburg and Berga Anticline (Thuringia), Zentralsächsische Lineament (Saxony). Four papers describing Early and Late Ordovician acritarch, chitinozoan and graptolite associations are published. Since July this year a new project dealing with Ordovician biostratigraphy in southern Bolivia (as a part of the present research programe SFB 267) has been in progress.

LINDA HINTS (Estonia) is continuing work on Late Ordovician brachiopods in the East Baltic. She took part in the compilation of the paleogeographic map for the Arenig in the East European Platform (IGC Project 319, Global paleogeography of Late Precambrian and Early Paleozoic).

LARS HOLMER (Sweden) and **Leonid Popov** are working on Cambrian and Lower Ordovician stratigraphy and brachiopods in Baltoscandia and Kazakhstan, partly in cooperation with **Robert Neuman** (US) and **Olga Nikitina** (Kazakhstan), including completion of a comprehensive paper on the late Arenig and Llanvirn biostratigraphy and brachiopods of Chu-Ili Range and adjacent areas (southern Kazakhstan). They are also planning to publish a revision of late Ordovician and early Silurian trimerellids from Kazakhstan. Other current collaborative studies of Leonid with **T. Ju. Tolmacheva** (Russia) include a description of a new Cambrian-Ordovician boundary section and conodont biostratigraphy from the area west of Balkhash Lake. This section is possibly the only known example of a Cambrian-Ordovician conodont biostratigraphic section in abyssal radiolarian cherts. Leonid is planning to stay at the University of Uppsala until July 1995.

NIGEL HUGHES (USA) has started sampling localities in the Middle Ordovician of Kentucky for silicified trilobites. This material is being processed in Ontario by **Jon Adrain** (Canada).

MAXINE HUSELBEE (UK) is working on conodonts across the Cambrian-Ordovician boundary interval in North Greenland, East Greenland and N.W. Scotland.

DIMITRI KALJO (Estonia) has been working with **Jaak Nolvak** and **Anneli Uutela** (Finland) on a paper discussing microfossil diversity changes during the Ordovician and on another paper devoted to different recovery scenarios after late Ordovician mass extinction.

MARTIN KELLER (Germany) continues his work on facies and sedimentology of the Cambro-Ordovician platform carbonate and slope slope deposits in the Argentine Precordillera. Therefore, he has been contributing many sedimentological aspects to the recent discussion of the allochthonous Precordillera and its derivation from Laurentia. His comparative studies in the Western US proceed. **John Cooper** (US) and Martin have been recently investigating the Early Ordovician miogeoclinal successions in Nevada and California. There, intraformational breccias and karst features are of special interest for comparison with eustatic sea-level changes.

JAROSLAV KRAFT (Czech Republic) continues his systematic study of Ordovician graptolites and stratigraphic research in the Arenig and Llanvirn (in cooperation with **Petr Kraft**).

PETR KRAFT (Czech Republic) continues stratigraphic research in the Arenig and Llanvirn (in cooperation with **Jaroslav Kraft**). His systematic studies deal with graptolites and problematics.

ALEXANDER LAST (Germany) is working on his M.Sc. thesis about Cambrian and Ordovician inarticulate brachiopods from several German localities (Schwarzburg Anticlinorium in Thuringia, Görlitz Anticlinorium in Saxony and northern Saxony). His thesis is mainly concerned with the evolution, systematic position and stratigraphic distribution of Tremadoc taxa belonging to the brachiopod family Obolidae.

JOHN LAURIE (Australia) has recently completed (with **John Shergold**) a monograph on the late Lancefieldian to early Bendigonian trilobites from the Emanuel Formation, Canning Basin. The work has been submitted to *Palaeontographica* for publication. Also recently completed is a paper on the trilobites and brachiopods from the overlying Gap Creek Formation (late Bendigonian). Work on the early Ordovician trilobite fauna of the Horn Valley Siltstone, Amadeus Basin, Northern Territory continues.

OLIVER LEHNERT (Germany) continues working on paleogeographical and biofacial aspects of Ordovician conodont faunas from the Argentine Precordillera. Especially tropical, Midcontinent type conodonts (Tremadoc/Arenig) from shallow marine environments on the Precordilleran platform reveal much information pertinent to recent discussions regarding the origin of this terrane. He is discussing new biostratigraphic data (Early to Upper Ordovician conodont faunas from different depositional environments) for the reconstruction of geodynamic processes in the Ordovician of the Precordillera.

JÖRG MALETZ (Germany) is working on Lower Ordovician graptolites. Work on the origin of biserial graptolites together with **Chuck Mitchell** is more or less finished. A paper about the base of the *Tetragraptus approximatus* zone in Sweden (Mount Hunneberg, Västergötland), together with **Stig Bergström** and **Anita Löfgren** is completed. He will now concentrate on the *Undulograptus austrodentatus* zone faunas from the Cow Head Group of western Newfoundland and the Levis Fm. of Quebec. Further work on isolated Llanvirn graptolites of the Table Head Group, western Newfoundland is in progress.

ULRICH MAYR (Canada) is pleased to announce that GSC has finally published Bulletin 470 on southern Ellesmere Island. Southern Ellesmere Island is part of the Ordovician stable platform and the bulletin describes the stratigraphy of about 2000 m of Ordovician peritidal carbonates and evaporites. Ordovician conodont biostratigraphy for the bulletin was done by **Godfrey Nowlan** and **Sandy McCracken**. The stratigraphy ties in with work done earlier on southern Devon Island and work in progress on Grinnell Peninsula (northern Devon Island). The southeastern part of the Ordovician stable platform in the Arctic Islands is thus mapped.

SANDY McCRACKEN (Canada) continues work on Ordovician-Silurian conodonts from northern Canada (Arctic Islands Islands, Baffin Island), northern Ontario, eastern

Quebec. New research will focus on Devonian conodonts of the Western Canada Sedimentary Basin. Ordovician-Silurian geochemical studies with **W. Goodfellow, C. Gergoire, M.J. Melchin, G.S. Nowlan, Kun Wang** continue.

TONU MEIDLA (Estonia) is continuing work on the late Ordovician ostracode faunas of Baltoscandia and on the Ordovician-Silurian boundary event.

MICHAL MERGL (Czech Republic) continues a systematic study of inarticulate brachiopods around both lower and upper Arenig boundaries in the Prague Basin (Bohemia).

CHUCK MITCHELL (USA) is continuing work with **John Delano, Dan Goldman** and **Stig Bergström** on an integrated K-bentonite/graptolite/conodont chronostratigraphy in the Middle Ordovician Trenton Group and Utica Shale deposited along the northeastern margin of North America during the Taconic Orogeny. Emerging correlations between the carbonate shelf and black shale basin are quite different that previous investigations have suggested. Since this region contains the stratotypes of the upper Middle Ordovician stages, these new correlations may have significant effects on late Middle and early Upper Ordovician chronostratigraphy in North America. With **Jörg Maletz**, Chuck has returned to work begun some years ago on the phylogeny and biostratigraphy of graptolites in the Table Head Group, western Newfoundland, as well as on the origins of diplograptid graptolites. Chuck is working with **Chen Xu, Zhang Yuan-dong, Wang Zhi-hao, Stig Bergström,** and **Jorg Maletz** on development of a proposal for a GSSP at the base of the *Undulograptus austrodentatus* Zone at Huangnitang, Changshan County, in Zhejiang Province, southeastern China.

JOACHIM MÜLLER (Germany) is working in the Eastern Cordillera of southern Bolivia in a mainly structural project contributing to the German NSF (DFG)-sponsored Special Research Program 267 "Andean Deformation Processes". He is currently attempting to revise the stratigraphy of the Ordovician units bordering on the Altiplano, i.e. the northern continuation of the Argentine Puna, together with **Bernd Erdtmann**.

JÜRI NEMLIHER (Estonia) has been working with **Ivar Puura** and **Toivo Kallaste** on a paper discussing the shell material properties of fossil lingulate brachiopods from Cambrian Ordovician boundary beds in Estonia.

BOB NEUMAN (USA) is continuing his effort to complete a manuscript on the "Upper Hovin Group" of Norway and its brachiopods, trilobites (by **David Bruton**, Norway) bivalves (by **John Pojeta**), and conodonts (by **Stig Bergström**).

M.H. NITECKI (USA) together with **J. Keith Rigby**, began working with **Z. Zhu, C. Liu** and **X. Li** of the Jianghan Petroleum Institute on the comparisons of the Lower

Ordovician reefs of China with those of North America, particularly the Texan and Utah structures. **Nitecki** and **Rigby** were led by their Chinese colleagues to the Chinese reefs along the Yangtze River in Hubei and Sichuan provinces.

JAAK NOLVAK (Estonia) continues work on Ordovician chitinozoans and stratigraphy from the Baltoscandia and in cooperation with colleagues **Yngve Grahn** (Sweden) and **Florentin Paris** (France) on chitinozoan dating of the Ordovician impact and some other events.

IVO PAALITS (Estonia and TU Berlin) is continuing his study of Early Ordovician acritarchs and chitinozoans from the eastern part of the East European Platform (Estonia, Lithuania, Moscow Basin). His main interest during the last year was concerned with the Tremadoc-Hunneberg boundary interval.

FLORENTIN PARIS (France) is still working on Ordovician chitinozoan biostratigraphy and palaeoenvironments in North Africa, Saudi Arabia and western Europe. Paleobiogeographic affinities within northern Gondwanan regions are also documented. The investigations carried out on ^{18}O from biogenic phosphates (e.g. inarticulate brachiopods and conodonts) with **Christophe Lecuyer** and **Michel Robardet** are in progress and new research is currently being developed on ^{13}C of organic microfossils (e.g.chitinozoans, scolecodonts) in cooperation with **Christophe Lecuyer**.

IVAR PUURA (Estonia) is working on the taxonomy and distribution of Cambrian and Lower Ordovician lingulate brachiopods from Baltoscandia. A comparative study of apatite mineralogy of fossil and Recent lingulate brachiopod shells is in progress (with **Jüri Nemliher**).

JOHN REPETSKI (USA) is finishing up the Ibexian stratotype Professional Paper ms, with **Rube Ross** *et al*. He is preparing for the ISOS meeting in Las Vagas this June; presentations (all collaborative) will be on Alaskan Ordovician correlations; Sonora Mexico successions, both shallow and deeper; and a Cambrian-Ordovician boundary succession in New Mexico. He is working on US faunas relevant to the SWEAT hypothesis concerning previous position of the South American Occidentalia terrane. Also there's a collaborative project on *Iapetognathus*, vis à vis base of the Tremadoc, with **Bob Nicoll, Godfrey Nowlan,** and **Jim Miller**. Stratigraphic, faunal, and CAI/surface alteration studies in various regions, related to bedrock mapping, hazards, and resource studies, as well as related to documenting and clarifying intra-Ordovician correlations are being worked on.

DAVID RUDKIN (Canada) and **Ron Tripp** have a paper submitted and another in the final stages of preparation dealing with Ordovician trilobites. The first is a review of the pliomerid subfamily Quinquecostinae based on material from North America, the UK, and

China. The second, co-authored with **Bill Evitt**, is on silicified Sphaerocoryphe from classic localities in Virginia. He has also coat-tailed onto a project with **Fred Hotchkiss** and **Derek Armstrong** (Ontario Geological Survey) describing a new Middle Ordovician ophiuroid from southcentral Ontario, which has been submitted for presentation at the 7th ISOS.

IVAN SANSOM (UK) is working on Ordovician/Silurian coniform conodont apparatuses, the histology of conodonts, and the morphology, histology and taxonomy of Ordovician agnathans in order to document the earliest evolutionary radiation of fish.

OLAF SCHMIDT-GÜNDEL (Germany) has completed his Ph.D. thesis about the graptolite fauna of the Bogo and Lo Shales in western Norway. This fauna is of late Arenig to early Llanvirn age. A short paper about two new species from these localities is in preparation. He also intends to publish a monograph (in English) on the complete Bogo-Lo fauna. He continues collecting a full bibliography on graptolite references. All colleagues who have not yet received a special letter from him are kindly requested to send him an updated list of their graptolite-related publications.

THOMAS SERVAIS (Belgium) is continuing his acritarch research from several sections covering East Avalonia, including biostratigraphical and palaeobiogeographical investigations. He has several publicatons in press on acritarch taxonomy, some of them in collaboration with other workers, e.g., **K.H. Eiserhardt** (Hamburg), **R. Brocke** (Berlin), and **O. Fatka** (Praha). He is also compiling "An annotated bibliographic index of Ordovician acritarchs". Presently, he is involved in a project with Late Ordovician corals and graptolites from Belgium, in collaboration with **D. Kaljo** and **J. Maletz**, respectively.

JOHN SHERGOLD (Australia) has now completed research on the trilobite taxonomy and biostratigraphy of the Early Ordovician, Bendigonian 1-2, Emanuel Formation of the Canning Basin, Western Australia. The trilobite taxonomy, co-authored with John Laurie, is in press with *Palaeontographica*. Short papers summarising the late Lancefieldian-Bendigonian biostratigraphy of the Prices Creek Group on the Lennard Shelf, Canning Basin, and the correlation of selected late Lancefieldian-Bendigonian successions, co-authored with John Laurie and Bob Nicoll, have been prepared for the 7th International Symposium on the Ordovician System, and should be available in Las Vegas in June.

LAWRENCE SHERWIN (Australia) is preparing work on the recently completed Narromine 1:250 000 geological map for publication and about to start on the Forbes 1:250 000. Both maps are in central New South Wales. The latter will provide an opportunity to revise and publish a very late Ordovician graptolite fauna.

PAUL SMITH (UK) continues work on the Ordovician of Greenland and spent the summer of 1994 mapping and collecting conodont profiles in eastern North Greenland with **Jan Audun Rasmussen** and **John Peel**. Work on Ordovician agnathans with **Ivan Sansom** is turning up some unexpected but interesting results, including a new articulated *Astraspis* and good histological data for *Anatolepis*.

ULF STURESSON (Sweden) is continuing his studies of iron oolites in Baltoscandia in cooperation with **Tnis Saadre** (Estonia). Field work will be done this year in Russia together with **Andrei Dronov** (Russia) and in Bohemia.

MURIEL VIDAL (France) is working on her Ph.D. thesis on Ordovician (Arenig) trilobites from Morocco and southern France, mainly asaphids (with **J.L. Henry** and **J. Destombes**).

ENRIQUE VILLAS PEDRUELO (Spain) is presently working on Ordovician brachiopods from the Cantabrian Mountains (Northern Spain), as well as on the *Foliomena* and *Hirnantia* fauna from Sardinia. A work on the lower Silurian (Telychian) brachiopods from Asturias (Northern Spain), with **Robin Cocks** (UK), is almost finished.

WANG Xiaofeng (China) is working with **Chen Xiaohong** on Ordovician palaeogeography and biogeography in China and Ordovician eustatic events in South China and their worldwide correlation. A final report on the Sinian and Lower Paleozoic organic petrography in Central Yantze platform for VW-Foundation has been finished together with **B.-D. Erdtmann**, **A. Hoffknecht**, **R. Brocke** and three other Chinese colleagues. Investigation on the origin and evolution of allochthonous terrane of Hainan Island, South China is continuing with **Ian Metcalfe**, **John Shergold**, **Zhang Renjie** and **Li Z.X.** The Stratigraphical Lexicon of Ordovician in China has been edited by **Wang Xiaofeng**, **Chen Xu**, **Chen Xiaohong** and **Zhu Ziying** and will be published soon.

MARK WILSON (USA) continues to work on Ordovician hardgrounds and the biological and physical systems associated with them. **Tim Palmer** (UK) and Mark are completing a project describing the petrologic fabrics in limestones resulting from sea-floor aragonite dissolution in the Ordovician "calcite seas". Mark, Tim and **Paul Taylor** (UK) published a short paper in *Lethaia* on bioimmured fossils preserved underneath Ordovician bryozoans. Paul and Mark published an extensive analysis of the Ordovician cyclostome bryozoan *Corynotrypa* in the *Journal of Paleontology*. Paul and Mark continue to work on other Ordovician bryozoans, including the enigmatic but common "*Proboscina*" and the Early Ordovician *Dianulites* group. **Andrew Smith** (UK) and Mark have finished describing a new cyclocystoid from the Upper Ordovician of Kentucky; the short paper will appear in the *Journal of Paleontology*.

ELLIS YOCHELSON (US) has completed a paper on *Macroscenella* in November-December *Journal of Paleontology* (no reprints yet). He has submitted to *Earth Sciences History* a manuscript on the early use of "Ordovician" in the United States, a sequel to the short paper published in the St. John's proceedings.

E. YOLKIN (Russia) continues to study mostly borehole materials (conodonts, trilobites) from the Western Siberian plain. Recently he has also, however, spent time working on Ordovician-Devonian paleogeographic reconstructions and their geodynamic interpretations.

GRAHAM YOUNG (Canada) has recently completed a study of latest Ordovician to earliest Silurian colonial corals of the east-central U.S. (with **Bob Elias**). Progress is being made with work on Late Ordovician tabulate corals of Manitoba. He is also continuing to study general aspects of growth and form of favositids and heliolitids.

HENRY WILLIAMS (Canada) has spent much of the past few months working with **Elliott Burden**, **Helen Gillespie**, **Felicity O'Brien** and **Grace Parsons** on the integrated biostratigraphy of a 15,000 foot oil exploration well currently being drilled in western Newfoundland by Hunt Oil Company, making a pleasant change from academia. Other recently completed and ongoing projects include a short study of Arenig scolecodonts from western Newfoundland (with **Nicole Underhay**) and graptolite growth rates (with **Arden Bashforth** and **Noel Dilly**).

JAN ZALASIEWICZ (UK) is studying upper Caradoc graptolite faunas from south Wales, in particular from the Whitland section. These are being compared with the classic Hartfell Shale graptolitic sequence, which is being revised by **Adrian Rushton**. Work is also beginning with **Sue Rigby** on estimating planktonic productivity, in part using Ordovician material.

AIDAR ZHYLKAIDAROV (Kazakhstan) is actively working in the field of Ordovician stratigraphy and the conodonts of Kazakstan. He has been working on the Ordovician conodonts and stratigraphy of some cherty and volcanic-cherty formation of Kazakstan (in cooperation with **I.F. Nikitin**). His current interests are connected with conodont associations from stratotype sections of the Ordovician divisions of Kazakstan and their relationships with other groups of fauna. His doctoral thesis was "Conodonts and stratigraphy of the Ordovician volcanogenic-cherty deposits of the South-West of the Chingis region". He has a good collection of free conodont elements with satisfactory preservation from Ordovician formations from many regions of Kazakstan which were obtained from cherty rocks through digestion with hydrofluoric acid. Collections of conodonts of the same age were collected from limestones of other areas for comparative purposes. He is currently having some problems with the publication of the descriptions of conodonts in national journals.

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