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Ordovician NEWS

IUGS COMMISSION ON STRATIGRAPHY
SUBCOMMISSION ON ORDOVICIAN STRATIGRAPHY

NO. 7 1990

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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 meetings, etc. As more geological software becomes available, details of this would also be welcomed by many of us. Also please ensure that we are notified of any changes in address or telephone number. Submissions for inclusion in the next issue of *Ordovician News* should arrive before 30 November 1990; when providing lists of recent publications, please include only fully refereed articles and books (not abstracts) published during 1990.

Contributions should be in English, typed double space and sent to: S.H. Williams, Dept. of Earth Sciences, Memorial University of Newfoundland, St. John's, Newfoundland A1B 3X5, Canada. For longer contributions, it would help if a copy was sent on 3 1/2" or 5 1/4" diskette if possible (either Macintosh or IBM).

EDITOR'S NOTE

Since the last issue of *Ordovician News* appeared, I have taken over as Editor from Barry Webby, who is to be commended for running it more or less single-handedly since its inception. The major purpose of this publication is to keep Ordovician workers informed of Ordovician Subcommission news, progress in Ordovician research, and all the latest on relocations, new publications, meetings, etc. The list of names and addresses of people receiving *Ordovician News* enclosed in this number has been substantially modified since the last issue, following circulation of the questionnaire last year. Only those workers who returned the circular have been included; I have added telephone, fax and telex numbers where given, and in a few cases electronic mail addresses, which I hope will come in handy.

If you are reading this copy over somebody else's shoulder and are wondering where yours has gone, did you return my circular? If you didn't, but still want to receive *Ordovician News*, or if you wish to be put on our mailing list for the first time, please write to me, including details of full postal address, telephone and fax numbers, etc.

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Barry H.L. Barnes, K.J. Rose Jr., S.M. Bergstrom, and others prepared papers to circulate among papers in advance of the meeting in Tallinn - sessions 2/3, 5/6, 7/8, 10/11, 12/13, 14/15, 16/17, 18/19, 20/21, 22/23, 24/25, 26/27, 28/29, 30/31, 32/33, 34/35, 36/37, 38/39, 40/41, 42/43, 44/45, 46/47, 48/49, 50/51, 52/53, 54/55, 56/57, 58/59, 60/61, 62/63, 64/65, 66/67, 68/69, 70/71, 72/73, 74/75, 76/77, 78/79, 80/81, 82/83, 84/85, 86/87, 88/89, 90/91, 92/93, 94/95, 96/97, 98/99, 100/101, 102/103, 104/105, 106/107, 108/109, 110/111, 112/113, 114/115, 116/117, 118/119, 120/121, 122/123, 124/125, 126/127, 128/129, 130/131, 132/133, 134/135, 136/137, 138/139, 140/141, 142/143, 144/145, 146/147, 148/149, 150/151, 152/153, 154/155, 156/157, 158/159, 160/161, 162/163, 164/165, 166/167, 168/169, 170/171, 172/173, 174/175, 176/177, 178/179, 180/181, 182/183, 184/185, 186/187, 188/189, 190/191, 192/193, 194/195, 196/197, 198/199, 199/200, 201/202, 203/204, 205/206, 207/208, 209/210, 211/212, 213/214, 215/216, 217/218, 219/220, 221/222, 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**MODIFIED VERSION OF 1989 ANNUAL REPORT
FROM THE SUBCOMMISSION ON ORDOVICIAN STRATIGRAPHY
TO IUGS****1. IUGS Subcommission on Ordovician Stratigraphy****2. Overall Objectives:**

- (a) Aims to standardize internal boundaries of the Ordovician System on a global basis (including the setting of international boundary stratotypes). As a preliminary we are preparing regional correlation charts with explanatory note and have regional chronostratigraphic appraisal of existing subdivisions and applications.
- (b) To promote the development and application of stratigraphic methods of all kinds for use in Ordovician correlation, and to clarify principles of stratigraphic procedure in order to establish a unified global Ordovician time scale.

3. Relationships to IUGS:

These objectives fit entirely within the framework of stated goals of the IUGS Science Policy, to encourage and promote the study of geological problems requiring international and interdisciplinary cooperation. Our work requires cooperation from many specialists worldwide, and using all possible stratigraphic methods (physical, chemical and biological) to establish a unified Ordovician time scale; and to promulgate the results of this work at International Geological Congresses, and at other IUGS sponsored international meetings.

4. Organization and Officers:

The Subcommission is a body of the Commission of Stratigraphy; it was established in 1974. The present Chairman Designate is B.D. Webby, the Vice Chairman I.F. Nikitin, and the Secretary Designate is S.H. Williams. Webby and Williams were nominated for election by committee chaired by the past Chairman of the Subcommission in June 1989, and voted on by the Titular members of the Subcommission prior to the 28th IGC (yet to be ratified by the International Commission on Stratigraphy). There are currently 20 voting members and 52 corresponding members. A number of regional chronostratigraphy working groups were established in 1983 for Britain, Baltoscandia, North America, China, Soviet Union and Australasia; the work of these groups has now been completed. Ordovician correlation charts and explanatory notes have been published regularly in a series of IUGS publications since 1980, and the newsletter, *Ordovician News*, has been produced regularly since 1983. Four new chronostratigraphy working groups were established in 1989, as well as a global facies, paleogeography and paleoceanography working group.

5. Nature of Support:

The Subcommission has wide regional and global support from Ordovician stratigraphers, paleontologists, paleomagnetists and geochronologists.

6. Interface with other global projects:

The Subcommission strongly supports (or has supported) the activities of the IUGS Cambrian-Ordovician, and Ordovician-Silurian boundary working groups, which have (or had) as primary aims, to standardize the boundaries at the bottom and top of the System. The former has now made substantial progress towards achieving its goal, and the latter has been disbanded now that the international boundary stratotype has been selected at Dob's Linn, Scotland. Links are also maintained with IGCP Project 216 on global bioevents.

7. Accomplishments:

- (a) The official meeting of the Subcommission on Ordovician Stratigraphy was held on 13 July in Washington D.C., and was attended by 38 persons. Notable achievements were the setting up of four global chronostratigraphy working groups to focus on the internal, major 'Series' subdivisions of the Ordovician System; also a global working group on facies, paleogeographic and paleoceanic maps. There were important changes in membership and the executive as outlined elsewhere.
- (b) Publication and distribution in March 1989 of the sixth issue of *Ordovician News*.
- (c) There was also a 'Friends of the Ordovician' meeting at the Geological Society of America meeting in St. Louis in November 1989.

8. Problems:

No problems were encountered. However one should comment that it seems unfortunate that the deliberations of the IUGS Cambrian-Ordovician Boundary Working Group are seemingly no nearer solution in 1989 than they were at the time of the Calgary meeting, in 1985.

9. Publications:

No further Ordovician correlation charts have been published in the last year, although several are in the pipeline. Also the contributed papers from the Fifth International Symposium on the Ordovician System held in St. John's, Newfoundland, Canada in 1988 are still to be published in a Proceedings volume, as a Geological Survey of Canada Paper (C.R. Barnes and S.H. Williams as coeditors).

11-13. Work Plan:

- (a) A first series of global chronostratigraphy discussions are scheduled to be held during the joint Ordovician-Silurian meeting in Tallinn, Estonia, in the second half of August 1990. It is hoped that convenors of the four working groups (W.B.N. Berry, D.L. Bruton/R.J. Ross Jr., S.M. Bergström and C.R. Barnes) will be able to circulate position papers in advance of the meeting in Tallinn - sessions will be scheduled for the 24 or 25 August. Formal invitations have been sent to all voting and corresponding members of the Subcommission. Dr. D. Kaljo, Director, Institute of Geology, Estonian Academy of Sciences, Tallinn, has also arranged Ordovician field excursions for each day from 20 August.

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Barry Webby
Chairman Designate

SUBCOMMISSION ON ORDOVICIAN STRATIGRAPHY MINUTES OF MEETING AT IGC, 13 JULY 1989, ROOM 30, CONVENTION CENTRE, WASHINGTON D.C.

The meeting was opened at 18.10.

- Welcome by Chris Barnes. Apologies for absence were received from June Phillips Ross and Brian Norford. Barnes informed the meeting that Rube Ross has suffered a heart attack two nights before and was now in George Washington Hospital recuperating. A card was circulated for everyone to sign. Noel James was thanked for his help in assisting Rube to hospital in the early hours of the morning. Barnes urged, as outgoing chairman,

that Titular and Corresponding Members should try to complete business regarding definition of series and systemic boundaries within the next few years, in order to demonstrate real achievement to ICS.

2. The agenda was approved, but item 13 (future meetings) was made item 10a.

3 - 4. Webby presented the Five Year Report of the Subcommission, as required by ICS, including the minutes of the previous meeting in St. John's. Following a short discussion, acceptance of the document was proposed by Yochelson, seconded by Erdtmann, and passed unanimously.

5. a) Fifth International Symposium on the Ordovician System, St. John's, August 1988. Barnes reported that about 130 people attended this successful meeting, with over 100 papers submitted, while 80-90 participants attended the evening workshops.

b) Williams reported that the field guides and abstract volume produced for VISOS had been reprinted, and were now available from him for \$CAN 20.00 per set, including postage.

c) Barnes reported that almost all manuscripts submitted for publication in the VISOS volume had been reviewed and returned to authors for revision. The volume should be published sometime during 1990.

6. Barnes gave a summary of progress for the IUGS correlation charts owing to Ross's absence. This series was established in order to provide a common data base for the principal Ordovician deposits of the world. The first produced was the Chinese chart in 1980, with Ross overseeing production of the series quickly and efficiently.

a) Charts still outstanding were those for Scandinavia (Bruton), Greenland, Central Europe (Erdtmann), Soviet Union-Baltic (Kaljo), North Africa (Legrand), South-East Asia (Burrett) and possibly a revised Chinese chart. Barnes recommended that the deadline for production of these final charts should be the Sixth Ordovician Symposium in Sydney, Australia. If any are still outstanding at this time, they should either be submitted as is, or put on hold. It would be of use to combine all the information at that time to produce a simplified global chart.

Bruton - he had promised in 1988 that the Scandinavian chart would be completed by Easter 1989. He was subsequently asked by the Norwegian Geological Survey to wait for the publication of their latest maps with formally revised lithostratigraphy. Apart from this delay, the Norwegian section was now ready for publication. The Swedish section is less complete, relying solely on contributions by Jaanusson. If the Swedish material was to be included, a further delay of at least 12 months was expected. Bergström had offered to write a good deal of the Swedish text to aid completion and allow production of a single volume for Norway and Sweden. There were still problems of which biostratigraphic and chronostratigraphic schemes to use. Bruton was unaware of what progress had been made regarding the Greenland chart, but Repetski stated that Smith had received a review and that it is now close to completion.

Erdtmann - not much progress had been made recently. He considered that the

Central Europe chart should include West and East Germany, Czechoslovakia, Belgium, Italy and other countries. Reports for Czechoslovakia and Belgium had been received in part, but nothing from the DDR. He hoped that the chart might be completed in 12 months, but to achieve this, some areas (e.g. DDR) might have to be dropped. Kaljo asked about Poland; Erdtmann suggested that it be included in an Estonian/Baltic or the Soviet chart. Kaljo considered it was best included in a Baltic-Soviet chart, but no discussion had been held with the Polish up to now. Barnes asked Erdtmann and Kaljo to come to some agreement during the IGS.

Kaljo - Männil had promised his part by the summer, but he now hopes to have it by the end of 1989. Barnes commented that there was no chart of the Urals. Could this be made into a Soviet Union chart III?

North Africa - nobody was present at the meeting to report on the status of the chart.

SE Asia - Webby reported that Clive Burrett had agreed to produce this chart, but no time frame had yet been fixed. Webby will request an outline and schedule from Burrett in view of the 1991 deadline.

China - Barnes suggested that the three voting members be contacted and asked for a revised chart by the 1991 deadline. Erdtmann agreed that a revised version was necessary.

Item 7 "Chronostratigraphy Working Groups", was moved to Item 12.

8. Ordovician News. Williams reported that he had taken over from Webby as Editor, and thanked Webby for his work in efficiently producing all issues up to that time. Circulation now stood at over 550 names, and both printing and mailing costs had risen to critical limits, despite the assistance of June Phillips Ross in mailing all North American copies. Williams therefore proposed that a questionnaire be sent to all individuals currently receiving Ordovician News, requesting confirmation of their wish to receive it and details of recent publications, etc. If these questionnaires are not returned, it will be assumed that those individuals are no longer interested in receiving Ordovician News, and their names will automatically be struck from the mailing list. The next issue of Ordovician News should be ready for circulation by January 1990.

9. Ordovician boundaries.

a) Cambrian Ordovician Boundary Working Group. Miller reported on the meeting held at IGC, owing to the absence of Norford who sent his apologies. He first summarised work completed to date. Two major volumes and 25 Working Group circulars had been published, the main sections had been visited, and several major resolutions passed namely: 1. The systemic boundary should be placed near the base of the Tremadoc, 2. The boundary should be based on conodonts and be close to or below the first occurrence of nematophorous graptolites, 3. The stratotype section should have potential for magnetostratigraphy, chemostratigraphy, etc. The two sections concentrated on were Dayangcha, China and Green Point, Canada. Three conodont horizons were under consideration, namely the bases of the *C. lindstromi*, *C. intermedius* and *C. proavus* zones. After 15 years' work, the publication of the Geological Magazine volume in 1988

finally allowed correlation between various continental successions.

Outstanding work must include the resolution of several major points of disagreement: first, the refinement of conodont taxonomy, and agreement of conodont workers regarding identification and taxonomy of taxa. The most suitable horizon must be decided; the Working Group is currently rather polarised in opinion regarding the suitability of horizons, and the application of magnetostratigraphy and chemostratigraphy must be further evaluated. Neither Green Point nor Dyangcha seem particularly suited as stratotype in the opinion of some Working Group members; Dyangcha has problems with access, limited exposure, and few conodonts have been recovered from the critical intervals. Green Point has few trilobites, while conodonts may have been reworked and are rare below the boundary interval.

The meeting on 10 July 1989 lasted four hours. That meeting proposed that discussion of sections considered previously for stratotype should be reopened; this proposal would be submitted to Voting Members for formal approval.

Barnes commented that in reply to the criticism written by Miller and for the information of Working Group members, himself, John Repetski and Felicity O'Brien had studied the types of Bruce and Jones, and all were in agreement that the specimens of *C. lindstromi* from Green Point were synonymous with the types from Australia. They had also checked the supposed specimen of *C. lindstromi* collected by Harris 1.6 m below the base of the *lindstromi* Zone at Green Point, which turned out to be an example of *C. proavus*. Repetski said that he would still be inclined to place that specimen within *C. lindstromi*, but further study of type material was needed first.

b) Ordovician-Silurian boundary. Kaljo reported on the meeting held during the Murchison Symposium at Keels, U.K. in April 1989. Dob's Linn had been ratified as Ordovician-Silurian Boundary Stratotype by IUGS in 1985. Since that time, a letter had been sent by the Canadian National Committee of IUGS expressing concern that the section at Dob's Linn did not fulfill many of the accepted stratotype criteria and suggesting that the decision be reconsidered. A reply from John Cowie noted that according to the rules of ICS, matters concerning this boundary are now the responsibility of the Silurian Subcommission following the disbanding of the Ordovician-Silurian Boundary Working Group. A long discussion was held in Keels, during which two points appeared, namely what rules should be used to make the decision regarding global stratotypes, and secondly the scientific problems associated with such points. Nowlan proposed the motion that "In the absence of clearly identified alternative sections or levels for the Ordovician-Silurian Boundary Stratotype, that formal reconsideration should be withheld until 1994". The motion was seconded by Holland and passed unanimously. This motion followed the guidelines that once a decision regarding a global stratotype is made, it may only be reconsidered after 8 years (two IGC's). There is clearly no point in formal discussion before this time, but it is suggested that new data is collected beforehand so that speedy reconsideration can be given after 1994 if deemed necessary.

10. During the VISOS at St. John's, Webby had proposed that the Sixth Ordovician Symposium should be held in Sydney, Australia, and this proposal had been adopted by the meeting. An organising committee had been set up, three of which (Webby,

Shergold, VandenBerg) were present at the meeting. The dates proposed for the scientific sessions were Sunday 14 July to Saturday 20 July 1991. This part of the meeting would be held at the University of Sydney, where residence accommodation for 100 people had already been reserved. Webby hopes to receive sponsorship by the Australian Academy of Science and Earth Resource Foundation among others. Webby proposed the technical sessions be divided into four major themes, two held on Monday and Tuesday, followed by a one day local geological/tourist trip around Sydney, then the final two themes on Thursday and Friday. Themes under consideration included chronostratigraphy, with particular emphasis on the proposed series working groups, economic deposits (global), environmental and paleogeographic reconstructions (global), and event stratigraphy and tectonics with concentration on the Lachlan Fold Belt in eastern Australia. In addition, general sessions would be held in the afternoons as needed.

Tentative proposals for field excursions were outlined by Shergold. It was hoped to offer two pre-and two post-sessional trips, each of which would last about one week. The first pre-sessional trip would be a central Australia excursion, including the Georgian and Amadeus basins, and possibly coordinated to be run with a Great Barrier Reef excursion led by Jell immediately beforehand. Shergold would lead the central Australia trip, which would be run safari-style, with 4x4 vehicles, etc. The second would be a central NSW excursion led by Webby. Post-sessional trips would include one to visit the Tasmanian platform sequences, led by Burrett, and one to study the type Victorian sequences, led by VandenBerg, which could be either pre- or post-sessional. In addition, Roger Cooper would be willing to take people around New Zealand in a tourist capacity, but pointed out that as most of the Ordovician sequences are in high mountainous terrain, it was unlikely that they would be accessible at that time of year.

Bruton asked whether Burrett might organise an excursion to Thailand and Malaysia; Shergold replied that Burrett is prepared to do so if sufficient interest is expressed. He would actually prefer such a trip over that proposed to Tasmania. VandenBerg offered to arrange visits to the Victoria Museum if anybody wishes to study their graptolite type collections. Shergold warned that the central Australia excursion would be run as a commercial trip, and would thus likely prove expensive.

11. Election of Officers.

a) The nominating committee (Ross/Bruton/Berry) had proposed new officers for the Subcommission, namely B.D. Webby (Chairman), I.F. Nikitin (Vice-Chairman) and S.H. Williams (Secretary). The ballot had been mailed and those received by Cowie indicated unanimous approval (14 for, 0 against). These officers were thus duly elected and would take over following the end of the IGC at Washington.

b) No further approval was needed for the nominations of new Titular Members made at the VISOS in St. John's and recorded on p. 6 of Ordovician News No. 6. R.A. Fortey, A.V. Kanygin, F. Paris and S.H. Williams are now, therefore, Voting Members of the Subcommission, while M.J. Destombes and H.B. Whittington have both requested to retire as Titular Members.

c) New Corresponding Members, as listed in Ordovician News, No. 6 include M. Bjerrreskov, Chen Junyuan, O. Fatka and J. Kirschvinck.

12 a) (originally 7). Chronostratigraphy Working Groups. Barnes recorded that these groups were established following the mandate suggested in Oslo 1982, with an aim to (i) establishing regional series terminology, (ii) identifying important zonal boundaries (i.e. possible bioevents), and (iii) presenting considered reports documenting details from most regions at the VISOS. There work was concluded formally at St. John's.

The Subcommission should now set up a series of subcommittees to (i) examine these zonal levels as potential series boundaries, (ii) consider the most suitable for use as global series, (iii) propose a principal Ordovician series classification, (iv) identify boundary stratotypes for each series (v) organize discussion of the proposals at or before the Sixth Ordovician Symposium with Titular and Corresponding Members, and (vi) if possible, make final recommendations to the ICS in 1992.

b) (originally 12). Webby circulated a document proposing the establishment of informal working groups of the Subcommission as discussed in 12a (attached). He suggested that four groups should be established, with hopefully neutral convenors, to examine possible horizons near the bases of the Arenig (Berry), Llanvirn (Bruton and Ross), Caradoc (Bergström) and Ashgill (Barnes). All interested Titular and Corresponding Members should contact convenors of groups in which they wish to actively participate, and advise the Chairman and Secretary of the Subcommission of their intentions. Each group must make an effort to have representation from researchers involved in paleomagnetism, chemostratigraphy, geochronology, all fossil groups etc. in addition to the usual plethora of conodont, graptolite and trilobite specialists. Webby proposed that preliminary statements from each group should be ready in one year; these could be given at the meeting in Tallin during August 1990 suggested by Kaljo and Barnes (Item 13), should this go ahead. Major statements from each group would be presented at Sydney in 1991, then decisions forwarded to IGC for ratification in Japan, 1992. The working groups' results would be published within the Sydney symposium volume.

Following some discussion, where it was made clear that the working group divisions need not bear any relationship to the final series of the Ordovician, Barnes proposed the motion as circulated, establishing the series working groups. This was moved by Williams, seconded by Miller and carried unanimously.

c) Bergström outlined his proposal to establish a long-term project involving the compilation of global paleogeographic maps, including details of biogeography, facies, etc. This was supported by Kirschvinck and Berry, although Kaljo questioned whether the Ordovician Subcommission was the correct organisation to coordinate such a project. Fortey asked where the money would come from for publication of maps; Barnes replied that funding would have to come as special projects from IUGS, or they could be published in standard scientific outlets (e.g. Geol. Mag., etc.). Webby considered it important to first discuss the project with the IUGS Subcommission on Sedimentary Geology regarding cooperation, and pointed out this had already been achieved for the Cretaceous. Barnes however felt that cooperation would be unlikely, and that it was best kept under the auspices of SOS. Bergström suggested that a new working group be established for the project; Barnes requested that anyone interested in the project should contact Bergström at the proposed meeting in Tallin. Webby asked for suggestions

regarding a convenor for the group; Bergström proposed Fortey, who agreed to coordinate the project but considered that the series of the Ordovician should be defined first to give a basic framework. Both Fortey and Bergström were asked to prepare a formal proposal for consideration at Tallin.

d-e). The SOS executive considered that the subject matter given for the two working groups proposed by Erdtmann would be covered at least in a preliminary fashion by the series working groups. Erdtmann pointed out the vast body of data available that could be checked by computer. He agreed that these topics could be covered by the series working groups, so long as they were aware of the complexities and partial independence from chronostratigraphic events. Copper asked why the Llandeilo was being ignored as a separate interval by the groups, as it was a time of significant brachiopod radiation; Barnes and Fortey responded that this was a British decision as the Llandeilo was short and often difficult to recognise compared with the other series.

13. Future meetings. Barnes noted that at St. John's interest had been shown in Estonia, China and South America, although the majority wanted the Sixth Ordovician Symposium in Australia. In September 1990 there would be a Cambrian meeting in Tallin, and it was planned to include a small meeting of Silurian Subcommission members. He and Kaljo suggested that this might be an appropriate time for Titular and a few Corresponding Members of SOS to meet, in order to check the progress of series working groups and give an opportunity to visit Estonian sections. At Keels, Chen Xu had given an invitation to SOS to visit W. China; Barnes considered 1993 would be the best time for this, with perhaps another small meeting in Argentina during 1994/95.

Kaljo proposed about 5 days of Ordovician day excursions, based in Tallin, followed by 3 days of Technical meetings on both Ordovician and Silurian matters, including a bioevents report, then 5 days of Silurian excursions. This program would start soon after the end of the Cambrian excursion. Erdtmann pointed out that the next Graptolite Conference would be in Nanjing during late September/early October, and could result in problems of attendance. An informal count showed that about half the Titular Members present could attend; Webby will contact others, then continue discussion with Kaljo. Kaljo then highlighted the possibility of an excursion travelling from China to Kazakhstan on the new railway. With regards to the other possible meetings, about 10 people were interested in both China and Argentina. Barnes reminded members of a "Friends of the Ordovician" meeting at GSA in St. Louis this November; this could provide another forum for discussion of the new working groups.

14. Other business. Webby pointed out that on the new international correlation chart by Cowie and Bassett that the lower Ordovician had lost out; for instance, the Arenig was squashed into a space about 1/10 of that for the Ashgill and Caradoc! SOS should respond. Also the two proposed British stages for the Arenig are accepted without comment.

The meeting adjourned at 21.00.

Henry Williams

FUTURE MEETINGS OF THE ORDOVICIAN SUBCOMMISSION

1. Tallinn, 19 - 25 August, 1990.

Following an invitation by Dim Kaljo, the Ordovician Subcommission is intending to meet in Tallinn later this year for several days of excursions and workshops, partly in conjunction with the Silurian Subcommission. One of the main items on the agenda will be discussion of initial feedback from the Working Groups on Ordovician Series established during IGC in Washington. All Voting and Corresponding Members should have received their invitations from Dim Kaljo some time ago. Any other Ordovician worker who is interested in participating should contact Dim immediately. It should be noted that at time of going to press, we have yet to receive final confirmation of arrangements for this meeting.

2. Sydney, 15 - 19 July, 1991.

The Sixth International Symposium on the Ordovician System will be held in Sydney, Australia during July next year, with Barry Webby as Chairman. For those people who have not yet received the First Circular direct from Barry, a copy is enclosed on the centre page of this issue of *Ordovician News*. A major theme for the meeting will be "Chronostratigraphy" (in all its aspects, including biostratigraphy, geochronology, magnetostratigraphy and chemostratigraphy). In addition to the technical sessions, a number of excursions are being offered to sites of Ordovician interest, plus there will be meetings and workshops for the Ordovician Subcommission and all Ordovician Working Groups of IUGS Commission on Stratigraphy. Position papers from the chronostratigraphy working groups will be published; hopefully some positive results will have been achieved by that time, and there will be some firm proposals for definitions of one or more revised global Series boundaries based on globally applicable and accepted biohorizons (with accompanying magnetic, geochronologic and/or chemical control). Hope to see you there!

ORDOVICIAN SUBCOMMISSION WORKING GROUPS ON GLOBAL CHRONOSTRATIGRAPHY

Four new global chronostratigraphy working groups were established at the official meeting of the Ordovician Subcommission on 13 July 1989 during the International Geological Congress in Washington D.C. They will focus attention on zonal levels which represent significant bioevents and/or exhibit excellent correlation potential within the System, and are relatively close to existing historical conceptions of the Series divisions. The aims will be:

1. Identify the most significant biohorizons for global correlation.
2. Use these in proposals for revised series boundaries.
3. Find the best boundary stratotype for each of these revised Series.
4. Have these Series subdivisions adopted by the Subcommission, as a first stage towards ratification by the International Commission on Stratigraphy.

Attention will be concentrated on levels with particularly good global ties, near the base of the 'Arenig', 'Llanvirn', 'Caradoc' and 'Ashgill', although it must be emphasized that

these working group divisions are arbitrary, and may bear no similarity to the final Series decided upon. The heads of the working groups are:

1. 'Arenig' group - W.B.N. Berry
2. 'Llanvirn' group - D.L. Bruton and R.J. Ross Jr.
3. 'Caradoc' group - S.M. Bergström
4. 'Ashgill' group - C.R. Barnes

Any Ordovician workers who wish to provide discussion documents are asked to send them to the relevant convenor, and to mail copies to Barry Webby and Henry Williams. It is planned to hold initial meetings of these groups during the Subcommission meeting at Tallinn this August.

WORKING GROUP ON GLOBAL MAPS OF THE ORDOVICIAN

During IGC in Washington, in addition to the working groups outlined above, it was resolved to establish a long-term project involving the compilation of global maps of Ordovician facies, biogeography and paleoceanography. R.A. Fortey agreed to be convenor of this working group, assisted by S.M. Bergström, P. Wilde, J. Wright, J. Kirschvink, and others. Anybody interested in actively participating in the group should contact Richard Fortey.

NEW CORRESPONDING MEMBERS

The following people have been made Corresponding Members of the Ordovician Subcommission in recognition of their expertise and contribution to Ordovician research: Clive Burrett (Australia), Richard Davies (USA), Francine Martin (Belgium), Bob Nicoll (Australia), Michael Taylor (USA), Robert Tucker (Canada).

WHO'S WHO IN THE ORDOVICIAN - KNOW YOUR SUBCOMMISSION MEMBERS

Enclosed with the last circular was an addendum to all Voting and Corresponding Members asking for a brief summary of their contribution to Ordovician research, and a list of their most significant publications in this field. Only a small number responded, but their summaries are given here. Unfortunately most members provided only a full bibliography which would have produced several hundred references in this section alone. I have not, therefore included these as originally intended, but will keep them on file for future use by the Subcommission.

For all those Voting and Corresponding Members who aren't included below: I hope that this section will become a regular feature in future editions of *Ordovician News*, so please send me a summary paragraph of your work (e.g. see those below for David Bruton and Richard Fortey) and a short list of publications (maximum of FIVE) that you consider to be your major contributions towards Ordovician research.

a) Voting Members**David Bruton (Norway)**

For the past ten years, David has coordinated research on Ordovician stratigraphy and faunas in Norway. This has included supervision of more than 20 research theses submitted by students from Norway, Great Britain, Ireland and Germany. Personal interests have been in Ordovician trilobites occurring in the Oslo Region and in the Caledonide fold belt. As secretary of the International Correlation Programme (IGCP) project on the Caledonide Orogen, he has also helped organise or coordinate paleontology and stratigraphy, especially Ordovician, at numerous international symposia from 1975 to 1985.

Interest in problems around the Cambrian-Ordovician boundary led David to clear the Nærnes section near Oslo and propose this as a candidate for a possible stratotype section. He has been a Corresponding Member of the Cambrian-Ordovician Boundary Working Group since its inception in 1974, and has joined the group on visits to sections in China in 1983 and 1986, as well as to those in Canada in 1984 and 1988; he organised the visit of the group to Norway in 1980. In 1980 David was elected a Voting Member of the Ordovician Subcommission and has contributed to groups involved with correlation and chronostratigraphy. In 1982 he organised the Fourth International Symposium on the Ordovician System in Norway and edited the resulting proceedings.

Richard Fortey (U.K.)

Richard has specialised on trilobites and graptolites, particularly from the early Ordovician. His major monograph (1974-1980) on *The Ordovician Trilobites of Spitsbergen*, published in several parts by the Norsk Polarinstitutt, recorded in detail one of the richest faunas ever discovered from the earlier Ordovician. Quantitative work on these collections also established the environmental control of trilobite faunas, which has had implications both for paleocontinental reconstructions and for problems of international correlation. In 1982 the graptolites from Spitsbergen were also described (jointly with R.A. Cooper), and the outstanding preservation of this material led to some important conclusions concerning the classification of the group as a whole.

Richard has also completed a long term study of the Arenig of the type area of Wales (jointly with R.M. Owens), which has revealed an unsuspected variety of faunas and a full biostratigraphical succession. This has been described in a major monograph of the British Museum, published in 1987. Extending from this work are studies of Ordovician faunas from many parts of the world, including Newfoundland, Australia, Greenland and South Africa. This has led to an extensive interest in the problems of paleobiogeography, particularly of the less studied marginal biofacies. Current Ordovician concerns include the international correlation of the standard Series, as based on the Anglo-Welsh succession, and a revision of the Tremadoc faunas. Richard is also in demand to produce general reviews on matters trilobitic, graptolitic and Ordovician (for example, the evidence for eustatic controls on faunal shifts in the Ordovician, 1984). He and his co-workers published the initial accounts of the western Newfoundland sections at the Cambrian-Ordovician boundary that contributed to the international correlation at this horizon. Richard has been a Corresponding Member of the Ordovician Subcommission

for several years, and was elected a Voting Member in 1989.

Lu Yanhao (China)

In the past ten years, Yanhao has paid particular attention to the following five topics:

1. The Cambrian and Ordovician biostratigraphy and trilobite faunas of southeast, southwest and central China.
2. Use of the bioenvironmental control hypothesis to search the Lower Cambrian phosphatic and polyelemental mineral deposits of China.
3. The provincialism, dispersion, development and phylogeny of trilobites.
4. The Cambrian-Ordovician boundary potential stratotype sections of China.
5. The ontogeny of the Ordovician trilobites *Playcoryphus sinensis* and *Dalmanitina nanchengensis*.

Wang Xiaofeng (China)

Xiaofeng's principal field of research concerns Ordovician and Silurian graptolites and biostratigraphy. He has been dealing with the Ordovician since 1961, his major contributions to Ordovician research being work on Ordovician graptolite taxonomy and biostratigraphy, the Ordovician-Silurian and Cambrian-Ordovician boundaries, paleogeography, and biological and geological events, particularly in China. Xiaofeng was elected Voting Member of the Ordovician Subcommission in 1989.

Barry Webby (Australia)

Barry's interests have been concentrated in areas of Ordovician paleontology and stratigraphy, in particular:

1. Global patterns of distributions of corals, sponges and stromatoporoids (biogeographic and temporal).
2. Australian Ordovician communities, especially coralline spongiomorphs as well as trace fossils, trilobites, brachiopods and nautiloids.
3. Ordovician boundaries and correlation, particularly in the context of the use of Australian biostratigraphic subdivisions.

Barry has been an active member of the Ordovician Subcommission for some time, and was Secretary and Editor of Ordovician News for several years until 1989 when he was elected Chairman.

Henry Williams (Canada)

Henry's research interests centre on Ordovician graptolite taxonomy and biostratigraphy, particularly their use in both local and global correlation and definition of chronostratigraphic boundaries. His early work was on the late Ordovician and early Silurian graptolites of Dob's Linn, Scotland, the data from which has been quoted widely since Dob's Linn was voted international Ordovician-Silurian Boundary Stratotype. Following completion of this research, he spent 1 1/2 years in Norway, working on Upper Ordovician graptolites from the Oslo Region and other topics with David Bruton, and was Secretary of the Fourth International Symposium on the Ordovician System in Norway.

Since 1983, Henry has been based in Newfoundland, Canada, where he initially spent three years describing the spectacularly-preserved Arenig graptolites from the Cow Head Group (with Bob Stevens), published as a monograph in 1988. Ongoing studies are concentrating on Lower and Upper Ordovician graptolites from central Newfoundland; despite intense disruption and deformation of both strata and graptolites, the fossils are providing a high resolution framework for a variety of structural, mineralogical and other studies, and supporting the hypothesis which correlates the area with the Midland Valley and Southern Uplands of Scotland. In 1988 he was Local Chairman for the Fifth International Symposium on the Ordovician System in Newfoundland, and is editing the proceedings (currently in press) together with Chris Barnes. In 1989, Henry was elected Voting Member and Secretary of the Ordovician Subcommission.

b) Corresponding Members

Mikhail Appolonov (USSR)

Major contributions to Ordovician research have included:

1. The study (with I.F. Nikitin, T.N. Koren, and others) of sections through the *D. mucronata* trilobite Zone, *Hirnantia* brachiopod beds and *G. persculptus* graptolite Zone in southern Kazakhstan.
2. The Cambrian-Ordovician boundary interval in southern Kazakhstan, and proposal of the Batyrbay section as global stratotype.
3. The evolution of paleo-Kazakhstan in the Ordovician (with Patalakha).
4. Compilation of the correlation chart for the Ordovician of Kazakhstan and Kirgizia (with Nikitin and others).
5. Study of the Ordovician of the Balkhash region (with Zhemchuzhnikov).

Matilda S. Beresi (Argentina)

Matilda's major contribution to Ordovician research is the biostratigraphy, including microfacies and biofacies determinations and interpretation of depositional environments, of the San Juan Formation limestones (Arenig-lower Llanvirn) in the area of the Precordillera, Argentina, in particular:

1. Study of calcareous microalgae such as *Nuia* in Lower Ordovician sections.
2. Biofacies integration from the upper part of the marine, calcareous sediments of Ordovician age and a transitional section to the graptolite bearing lutites, and comparison with similar biofacies in Europe, North America and Australia.
3. Correlation on the basis of conodont biozones.
4. The macro- and micro-fauna and its paleoecological significance.
5. Origin and evolution of the conditions of deposition of the Ordovician Precordillera carbonate basin, and its paleoenvironmental interpretation.

Robin Cocks (U.K.)

Major Ordovician contributions have included:

1. Ordovician-Silurian boundary studies (Robin was Secretary of the Ordovician-Silurian Boundary Working Group from 1974 to 1984)
2. Global paleogeographic reconstructions (with Richard Fortey).

3. Brachiopods and paleoecology of the Ashgill of Norway (with Pat Brenchley).
4. Study of selected brachiopod faunas and groups, notably a review of the Plectambonitacea genera and species, and *Foliomena* fauna (with Rong Jia-yu).

Roger Cooper (New Zealand)

Major contributions to Ordovician research have included:

1. Ordovician stratigraphy and biostratigraphy of New Zealand.
2. Graptolite biostratigraphy of Australasia and Spitsbergen (including joint work with Ian Stewart, Richard Fortey and Fons VandenBerg).
3. Graptolite taxonomy, evolution and classification (with Richard Fortey and Ni Yunan).
4. Precise world correlation of graptolite sequences, and graptolite paleoecology (both projects in prep.).
5. Tectonostratigraphy of New Zealand Lower Paleozoic.
6. Lower Paleozoic relationships between New Zealand, Australia and Antarctica.

Ray Ethington (USA)

Major contributions to Ordovician research have included:

1. Taxonomy and biostratigraphy of Lower Ordovician conodonts of central and western United States.
2. Definition of the base of the Whiterockian Series in the type area in central Nevada using conodonts to supplement the traditional invertebrate fossils of the original definition. This effort is on-going, with new collections made in May 1989 with the assistance of Rube Ross.

Stanley Finney (USA)

Major contributions to Ordovician research have included:

1. Graptolites: taxonomy, evolution, biostratigraphy, biogeography: in particular, description of isolated material of which there is much still to be done (e.g. several groups from the Athens Shale of Alabama represented by isolated specimens); Middle to Upper Ordovician biostratigraphy of Appalachians, Arbuckles, Ouachitas, and Cordillera.
2. Use of graptolite biostratigraphy to solve geologic problems. Work has involved: a) dating base of Middle Ordovician shales in southern Appalachians in order to determine the timing of subsidence and migration of the Taconic Foreland basin as a means of investigating the onset of the Taconic Orogeny; b) precise correlation of Middle to Upper Ordovician sequences in Arbuckle and Ouachita Mountains of Oklahoma and Arkansas in order to relate the depositional histories of these areas to each other and to the rest of North America; c) precise correlation of sandstones in Roberts Mountains Allochthon at many localities in Nevada in order to determine the depositional history and source area of these sands. Determination of the source area has significant bearing on understanding the geological evolution of western North America in the Lower Paleozoic. This project recently initiated will be the focus of his research for the next few years.

Chris Hughes (UK)

Chris' contribution to Ordovician research over the last decade has consisted mainly of studies of trilobite faunas and stratigraphy of the Lower Ordovician, particularly in Britain and South America.

Rolf Ludvigsen (Canada)

Rolf's main research effort over the past fifteen years has been directed towards the establishment of trilobite-based biostratigraphic schemes for key outcrop areas of Cambrian, Ordovician and Silurian rocks in Canada (Rockie Mountains, Mackenzie Mountains, Newfoundland and Anticosti Island).

Robert Neuman (USA)

Major contributions to Ordovician research have included the description and revision of Arenig/Llanvirn brachiopods in "suspect terranes" around the North Atlantic Ocean, leading to tectonic and paleogeographic interpretations.

Godfrey Nowlan (Canada)

Godfrey has worked on Ordovician conodont biostratigraphy in many regions of Canada, including the Arctic Islands, Northwest Territories, Williston Basin, Hudson Bay Lowlands and the Appalachian Orogen. Most of his effort in the past ten years has been on obtaining conodonts from deformed strata in the Appalachian region and attempting to interpret them in terms of the history of the orogen. Monographic works have been completed on Early Ordovician conodonts of the Arctic, late Ordovician conodonts of the Northwest Territories and of Anticosti Island. Current work focuses on the paleontology and geochemistry of the Ordovician-Silurian boundary.

Hans Schönlau (Austria)

Interest in Ordovician research has been focused on Upper Ordovician biostratigraphy in the Circum-Mediterranean region with special reference to conodonts, trilobites and brachiopods. In addition Hans' interests concern tectonic-magmatic evolution of Central Europe in terms of plate tectonic concepts, and its integration into the global evolution of the Earth. Special interest has also been developed on mass extinction events, including that associated with the Ordovician-Silurian boundary.

John Shergold (Australia)

Since the late 1960's, John has been actively involved with Late Cambrian-Early Ordovician biostratigraphy, latterly concentrating on the systemic boundary interval. Consequently, he has contributed to both the Cambrian and Ordovician Subcommissions and to the Cambrian-Ordovician Boundary Working Group. John's main contribution to the Ordovician has been associated with the stratigraphy of the Georgina Basin of northern Australia in particular, and earliest Ordovician trilobite systematics and biostratigraphy.

Mary Wade (Australia)

Mary's contributions have been mainly in nautiloid taxonomy, which since nautiloids diversified largely in the Ordovician, is largely Ordovician nautiloid taxonomy. This has also produced spin-offs in understanding and correlation of marine faunal provinces, and increasing accuracy in zonations.

Anthony Wright (Northern Ireland, UK)

Tony's main Ordovician research has been concerned with Upper Ordovician brachiopods in north-west Europe, the Ashgill Series in northern England, Hirnantian faunas, and the Ordovician-Silurian boundary.

PROCEEDINGS OF VISOS, ST. JOHN'S, AUGUST 1988

All revised manuscripts have now been received and accepted by the editors, and have been passed to the publications office of the Geological Survey of Canada, Ottawa for final technical editing and typesetting. The publication schedule is thus now dependent on the G.S.C., but we hope to have galley proofs sent to authors within the next couple of months and final publication this summer. All those who were registered participants at the Fifth International Symposium on the Ordovician System will receive details of publication, cost, etc. once we receive such information from the G.S.C. Details concerning ordering and purchase of the volume for non-participants at St. John's will be circulated in the next issue of *Ordovician News*, and in other publication outlets.

Chris Barnes, Henry Williams
Editors, VISOS proceedings volume

NEWFOUNDLAND FIELD GUIDES FROM VISOS

Following several requests, we have had the three field guides from the Fifth International Symposium reprinted. These invaluable, state-of-the-art summaries of Newfoundland Ordovician geology are not available at any book store! They may, however be ordered for the bargain price of 20 Canadian Dollars (including postage) from Henry Williams. Please send cheque or money order made out to "Fifth International Symposium on the Ordovician System".

HOT OFF (AND ALMOST OFF) THE PRESS!

Ludvigsen, R., Westrop, S.R. and Kindle, C.H. 1989. Sunwaptan (Upper Cambrian) trilobites of the Cow Head Group, western Newfoundland. *Palaeontographica Canadana* No. 6. Price \$(Can) 33.00 plus postage and handling. Order from: Geological Association of Canada Publications, Department of Earth Sciences, Memorial University of Newfoundland, St. John's, Newfoundland A1B 3X5, Canada. Copies of *Palaeontographica Canadana* Nos. 1 to 5 also available at same address.

'Graptolites: Writing in the Rocks', edited by Palmer, C. and Rickards, R.B. To be published in June 1990. c. 130 plates, 250 pp, approx. £35 (\$67). Details of special pre-publication offer from: Boydell and Brewer Ltd., P.O. Box 9, Woodbridge, Suffolk IP12 3DF, U.K.

CAMBRIAN NEWSLETTER

The Institute for Cambrian Studies plans to publish a newsletter beginning this winter, patterned on a similar style to *Ordovician News*. Anybody interested in contributing items of interest, or in receiving the newsletter, should contact Michael E. Taylor in Denver (Mike's full address is given in the *Ordovician News* mailing list).

THE TRILOBITE PAPERS

The first issue of this annual newsletter was published in October 1989. It should serve as an informative and lively medium for the exchange of data and ideas among trilobite workers. The first issue includes research reports from 65 paleontologists as well as news items and short articles. For further information contact the editor: Rolf Ludvigsen, Denman Institute for Research on Trilobites, 4062 Wren Road, Denman Island, B.C., CANADA V0R 1T0.

EARTH SCIENCES HISTORY

Ellis Yochelson informs me that Volume 8 (Part 2) of this journal will be devoted to the concept of geological time. If you don't already have a subscription but are interested in this issue, contact Ellis in Washington D.C. (his full address is in the *Ordovician News* mailing list).

A BYTE OUT OF THE APPLE

Bob Sloan has now produced a program for the Macintosh which facilitates identifications for 95% of North American Ordovician trilobites. It includes information on some 770 North American genera from Cambrian to Permian, with both descriptions and scanned images from the entire body of North American literature published in and since the Treatise of Invertebrate Paleontology Volume O. The program requires a Mac Plus or greater and Hypercard, and is available from Bob Sloan to any Ordovician worker providing three 3 1/2" 800K disks (for Bob's address, see mailing list in this volume of *Ordovician News*).

NEWS AND CURRENT RESEARCH OF ORDOVICIAN WORKERS

Ricardo Astini (Argentina)

Clastic sedimentary paleoenvironments and depositional sequences of the Precordillera Basin, western Argentina (Ph.D. thesis).

Derek Briggs (UK)

"Beecher's Trilobite Bed" in the late Ordovician Frankfort Shale north of Rome, New York State, has become the subject of a field study and extensive sampling programme (in collaboration with R. Raiswell and S. Bottrell of the University of Leeds). This locality is of prime importance as the only significant exceptionally preserved biota known from the Ordovician, and one of only two examples of extensive soft-part preservation in pyrite. Our sampling was made possible by the rediscovery of the locality and a new excavation (in August 1989) by the Smithsonian Institution and the American Museum of Natural History.

David Bruton (Norway)

In addition to general work on Ordovician trilobites and revision of certain sections for the new Trilobite Treatise, I am completing a monograph of illaenid trilobites from Morocco, and drafting the Norwegian Ordovician correlation chart. A revision of the Norwegian Ordovician lithostratigraphy, jointly with A.W. Owen and J.F. and T.G. Bocklelie is complete and will be submitted for publication by the end of 1989.

Roger Cooper (New Zealand)

A recent project (with K. Lindholm) on the Early Ordovician (Tremadoc-Llanvirn inclusive) graptolite sequences of the world reveals the remarkable precision in correlation achievable with graptolites. A modified graphic correlation technique was used to reveal a sequence of 72 discrete bioevents (first and last appearance events) in the Early Ordovician (ca. 50 Ma), based on sequences in Australia, North America and Scandinavia. This gives an average duration per event of only 0.7 Ma. A precise correlation of 14 Early Ordovician graptolite sequences around the world has been prepared.

A second project (with R.A. Fortey and K. Lindholm) on the effects of latitudinal and depth zonation on the distribution of Early Ordovician graptolites reveals that depth has the greatest influence, but that most graptolites were eurythermic and not restricted to particular depth facies (i.e. lived in the epipelagic zone). The "deepwater" graptolite biotope lay below the 150-200 m depth level.

Ray Ethington (USA)

Research on the distribution of conodonts in the Lower Ordovician part of the Arbuckle Group in the Arbuckle and Wichita Mountains, Oklahoma is nearly complete and has been reported orally at recent meetings; it will be presented in a field trip of the Pandor Society in March 1990; collections of conodonts from graptolite facies of Early and Middle Ordovician age in the Ouachita Mountains, west central Arkansas and southeastern Oklahoma is continuing.

Yngve Grahn (Sweden)

At present I am working with Ordovician to Devonian stratigraphy of Paleozoic basins in Brazil. The biostratigraphy is based on chitinozoans, and the results will be published in due time.

Marcus Johnson (USA)

My major interests have shifted to the description of ancient rocky shores (both in terms of physical features and paleontological features, i.e. encrusting and boring organisms). I would be grateful for any information leading to interesting unconformities representing Ordovician rocky shores, in particular bibliographic information.

Rossitsa Kalvacheva (Bulgaria)

Current research involves the acritarch dating of low-grade metamorphic rocks (Early Ordovician) in Bulgaria and South Italy.

Kuo Hungchun (China)

New data on stratigraphy and paleontology of Upper Cambrian and Lower Ordovician strata have been obtained in southern Jilin. There we continue to study trilobites (Kuo Hungchun, Zhang Meisheng, Ding Xuan) and conodonts (Zhao Da), together with supplementary and special studies.

Ed Landing (USA)

Field and laboratory work on conodont-trilobite biostratigraphy and depositional environments of the Highgate Formation, northwestern Vermont and adjacent Quebec has been completed (collaborative project with S.R. Westrop), the project has led to recognition of a relatively continuous uppermost Cambrian through uppermost Canadian faunal sequence in these upper slope deposits; Early Ordovician (Tremadocian-lowermost Arenigian) trilobites, conodonts, chitinozoans and rare graptolites of the Macleod Brook Formation, Cape Breton Island are under study with R.A. Fortey.

Sandy McCracken (Canada)

Work on conodonts from northern Canada (Yukon: Ordovician-Silurian, Baffin Island: Late Ordovician) continues. In the Arctic Islands we have recognised the latest Ordovician *G. ensifer* and the earliest Silurian *O.? nathani* zones, among others. These are associated with good graptolite faunas. Geochemical studies with G.S. Nowlan, W. Goodfellow and A.C. Lenz continue, with a short manuscript in progress. CAI and MVT fluid inclusion work with D. Sangster, G.S. Nowlan and C.R. Barnes also continues.

Richard Owens (UK)

With Richard Fortey, work continues on the Tremadoc of south Shropshire. A new well-preserved trilobite fauna is being described from high in the Shineton Shales in their type area; in addition to the well-known *Conophrys salopiensis* ('*Shumardia pusilla*' of many publications) and *Asaphellus homfrayi*, it includes new species of *Rhabdinopleura* and *Leiagnostus*. A diverse calcichordate fauna, the first from the British Tremadoc, has also been recovered, and is to be described by Dick Jeffries.

Farther west, in the Shelve inlier we have been able to demonstrate that the Habberley Shales are younger than the Shineton Shales, and are not their lateral equivalents as was formerly supposed. They represent the highest Tremadoc, and are overlain, apparently conformably, by the Stiperstones Quartzite; if there is a break, it is

unlikely to be of any great magnitude. Unfortunately fossils are sparse, the commonest being the trilobite *Asaphellus cf. graffi* and lingulacean brachiopods. Further fieldwork is planned at Shelve, with the hope (probably vain!) of recovering further faunas.

RECENT PUBLICATIONS ON THE ORDOVICIAN

The following bibliography was compiled from lists returned in the *Ordovician News* circular. Due to lack of space I have not included references in press, any listed in previous bibliographies of *Ordovician News* or published before 1988, or any abstracts. I hope it will, however, prove a useful source of data.

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The following list of names, addresses, telephone numbers, etc. was compiled through returned copies of the Circular sent out last year. It is 50% shorter than for the last volume of *Ordovician News*, owing to the large number of people failing to reply. I expect to hear from many of these Ordovician workers following publication of this issue, and their names and addresses will be included in the next volume. Please let me know of any errors or changes in the present list by 30 November 1990 for inclusion in the next issue of *Ordovician News*.

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