ORDOVICIAN NEWS

SUBCOMMISSION ON ORDOVICIAN STRATIGRAPHY
INTERNATIONAL COMMISSION ON STRATIGRAPHY

Nº 17

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http://ceor.seos.uvic.ca/ordovician

Cover: view of the San Juan River (to East) in the Argentine Precordillera, and Ordovician carbonate outcrops in foreground. One of the localities to be visited during the next ISOS 2003.

NOTE 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 meetings, etc. As more geological software becomes available, details of this would also be welcomed by many of us. Also please ensure the SOS´s Secretary (responsible editor) is notified of any changes in address, telephone or fax number and e-mail address.

EDITOR'S NOTE

Welcome to the second electronic edition of *Ordovician News*! Hopefully this new edition is marking a transition to exclusively electronic distribution. However, we are still mailing hard copies to those who ask for a printed version or who are not able to get into the network. Our previous electronic distribution was very successful, particularly by dramatically diminishing costs of printing and postage. As a new alternative, it allows us to have the newsletter in the personal computer for permanent and easy access. In case members of the Ordovician community have any comment on this issue, the secretary would be pleased to hear from them. I would like to thank you all for the many contributions for the current number; your electronic files made an easier editing job.

The present issue includes particular information related to the last *International Symposium on the Ordovician System*, held in the magnificent Prague, in June, 1999, and recent advances on proposed stratotypes, and names for the Global Ordovician Subdivisions. Also you will find information on several new international projects, meetings and honorary notes. And, as always, your personal contributions on current research and publications.

I appreciate very much your confidence in my service to the secretariat of the Subcommission, since I was elected formal secretary at the Prague Symposium.

I am particularly grateful for the special assistance and technical support provided by Chris Barnes and Sue Dunlop (CEOR, University of Victoria, CANADA) in order to install *Ordovician News* in the Web. Ed Landing kindly afforded the postal distribution of *Ordovician News* through the *Center for Stratigraphy and Paleontology*, New York State Museum, Albany, U.S.A.

Ordovician News, by all means, an Inter-National contribution!

GUILLERMO L. ALBANESI

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CHAIRMAN´S REPORT

The last 12 months were especially noteworthy for the Ordovician Subcommission. More than 150 of us met in beautiful Prague in late June 1999 at the 8th International Symposium on the Ordovician System, and the GSSP (Global Stratotype and Point) for the base of the Ordovician System, the Cambrian/Ordovician boundary, was approved and ratified by the Ordovician Subcommission, the International Commission on Stratigraphy, and the Executive Committee of the International Union of Geological Sciences. Over the next 12 months, I expect the Subcommission to make substantial progress in selecting GSSPs for additional series and stage boundaries, and Subcommission sponsored activities are scheduled for the 31st International Geological Congress in August 2000 and the Annual Meeting of the Geological Society of America in November 2000.

8th ISOS

The Prague Symposium - the 8th international meeting of Ordovician workers in 28 years - extended the admirable record of successful meetings sponsored by the Ordovician Subcommission. Olda Fatka, Petr Kraft, and their many colleagues and assistants are to be applauded for developing and managing a program that included 140+ papers presented over four days; a pre-meeting excursion that examined the Ordovician stratigraphy of Poland and Germany; a half-day excursion in Prague that concluded with Czech beer; an evening concert; a post-meeting field trip through the classic Ordovician Stratigraphy of the Prague Basin (Barrandian area), which concluded with a sausage barbecue and more Czech beer; and several open meetings and business meetings of the Subcommission. It included many papers on the Ordovician Biodiversification Event and on the Global Ordovician Earth Systems Program. I congratulate Olda and Petr for producing a symposium proceedings volume (*Acta Universitatis Carolinae, Geologica*, v. 43, no. 1/2) that adds immensely to the already impressive list of publications resulting from Ordovician Symposia. With 143 papers, the proceedings volume will serve as a lasting reference and ready source of information on Ordovician paleontology, stratigraphy, and geology. With exceptional effort and dedication, the editors completed the volume in time for distribution at the Symposium - a superhuman effort. The lecture rooms at Charles University were excellent and accommodated two concurrent sessions on most days. The closing ceremony was a highlight for all in attendance. Held in the original 14th century hall of the University, it featured the Vice-Rector of Charles University, a procession of titular members accompanied by organ music, and the presentation of a Gold Medal to Stig Bergström. It was followed by a sumptuous banquet with plenty of Czech beer and other assorted alcoholic beverages. Not only was the meeting outstanding, but so too were the sites (medieval palaces, cathedrals, Charles Bridge, to name a few) the people of Prague, and the company of our colleagues. Argentina was selected as the host country of our next meeting - the 9th International Symposium on the Ordovician System - scheduled for 2003.

The Subcommission held three open meetings at Prague. Each one, scheduled for an evening, lasted two hours. The first one focused on the Green Point GSSP proposal for the base of the Ordovician System that was presented by the Cambrian-Ordovician Boundary Working Group led by Roger Cooper and Godfrey Nowlan. All aspects of the issue were discussed; everyone had a chance to present their arguments whether for or against Green Point. The discussions were particularly valuable to the titular members in attendance in preparation for their vote on the GSSP proposal. The topic of the second open meeting was the candidate stratotype section for the base of the second stage of the Ordovician System defined on the first appearance of *Tetragraptus approximatus*. There are two candidate sections: the Ledge at Cow Head, western Newfoundland and Diabasbrottet at Mt. Hunneberg, southern Sweden. Henry Williams and Godfrey Nowlan presented the case for the Ledge section; Stig Bergström and Jorg Maletz argued for the Diabasbrottet section. Not only was the relative quality of the two sections discussed at length, but also the adequacy of the first appearance of *Tetragraptus approximatus* as the defining biohorizon. Topics for the third meeting included 1) recent investigations and relative merits of candidate stratotype sections for the base of the *Nemagraptus gracilis* Zone, the base of the Upper Ordovician Series; 2) a progress report on determining the base of the uppermost stage of the Ordovician, the upper stage of the Upper Ordovician Series; and 3) a proposal from Argentine colleagues to host the next Ordovician Symposium. Because of excessive length, detailed minutes prepared for the open meetings are not published in the newsletter. However, upon request, copies can be obtained from Secretary Albanesi or from me.

Two Subcommission business meetings were scheduled and attended by sixteen of twenty-one titular members who were able to travel to Prague. The highlight of the first meeting was the formal election of

Guillermo Albanesi as Secretary and Titular Member of the Subcommission. At the second meeting, the titular members voted unanimously to proceed with postal ballots on the Green Point GSSP proposal and on the candidate stratotype sections for the base of the second stage of the Ordovician. In addition, the Subcommission approved the proposal from Argentina to host the 9th International Symposium on the Ordovician System. Minutes of the business meetings are included in this newsletter.

Progress on GSSPs

The postal ballot on the Green Point GSSP proposal for the base of the Ordovician System was completed in October 1999. The proposal was approved with an 89% majority. Voting was as follows:

Albanesi (Argentina)	Yes
Aceñolaza (Argentina)	Yes
Apollonov (Kazakhstan)	No
Barnes (Canada)	Yes
Bergström (USA)	Yes
Bruton (Norway)	Yes
Chen (China)	Abstain
Cooper (New Zealand)	Yes
Fatka (Czech Republic)	Yes
Finney (USA)	Yes
Fortey (UK)	Yes
Gutiérrez-Marco (Spain)	Yes
Huff (USA)	Yes
Mitchell (USA)	Yes
Nicoll (Australia)	Yes
Owen (UK)	Yes
Paris (France)	Yes
Popov (Russia)	No
Wang (China)	Abstain
Williams (Canada)	Yes
Zhou (China)	Abstain

Totals: Yes - 16; No - 2; Abstain - 3
89% approval of GSSP (abstentions are not counted in determination)

Subsequently, the proposal was accepted by the International Commission on Stratigraphy. Sixteen of 22 (73%) commission members voted. Of these, 15 (94%) voted yes, 0 abstained, and 1 (6%) voted no. Then, the Executive Committee of the IUGS ratified the Green Point GSSP at its annual meeting in January 2000.

The Green Point GSSP defined not only the base of the Ordovician System and the Lower Ordovician Series, but also the lowest Stage of the Ordovician. After extended discussion by electronic mail, the titular members unanimously approved the name Tremadocian for the lowest stage in a vote completed in January 2000.

Although many can find fault with the GSSPs for the lower and upper boundaries of the Ordovician System, the limits of the System are formally defined for the first time. I congratulate the members of the boundary workers groups and of the Subcommission who have devoted tremendous time and effort to these decisions. I especially thank those who participated in the discussions on the Green Point GSSP at Prague. Their input was valued by the titular members who had to make informed votes.

Voting on the two candidate stratotype sections (the Ledge and Diabasbrottet) for the base of the second stage of the Ordovician System (= the first appearance of *Tetragraptus approximatus*) should be underway at the time you read this. The Subcommission decided to delay selection of a proper name for this stage until its upper limit (=the base of the Middle Ordovician Series) is determined.

In a paper recently accepted for publication in *Episodes*, Stig Bergström and several co-authors, including myself, propose the section at Fågelsång, Scania, southern Sweden as the global stratotype for the base of the Upper Ordovician Series (= base of the *Nemagraptus gracilis* graptolite zone). Other sections under consideration included those at Calera, Alabama, USA and Dawangou, Xinjiang, China. This GSSP proposal should come to a vote of the Subcommission before the end of 2000.

Selection of a GSSP for the base of the Middle Ordovician Series may prove to be contentious. The defining biohorizon (first appearance of *Tripodus laevis*) and the candidate stratotype section at Whiterock Narrows need to be re-evaluated. To ensure progress, special activities, sponsored by the Subcommission, have been organized in conjunction with the Annual Meeting of the Geological Society of America to be held November 9-18, 2000, in Reno, Nevada. These include a technical session, field trip, and formal Subcommission business meeting, and are described in more detail in this newsletter.

Other Activities

In addition to the activities scheduled for the Geological Society of America meeting described above and elsewhere in the newsletter, the Ordovician Subcommission is sponsoring a symposium session at the 31st International Geological Congress, in Rio de Janeiro, Brazil in August 2000. The session is titled: Paleontological, stratigraphical, and paleogeographical relations among South America, Laurentia, Avalonia, and Baltica during the Ordovician. Enough abstracts were submitted to ensure a full program that includes a

poster session on August 9th and an oral session on August 11th. In addition, Barry Webby is convening a session on the Great Ordovician Biodiversification Event.

Many Ordovician scientists participate in IGCP Project 410, which is headed by Barry Webby, Florentin Paris, and Mary Droser. At the Prague Symposium extended workshops were organized for Project 410 participants, a special IGCP410/CIMP-sponsored Ordovician Palynomorph Session was organized by Florentin Paris and colleagues, and an additional 44 papers on Ordovician biodiversity were presented. Project 410 provides substantial support for activities that also support the objectives of the Ordovician Subcommission, and the vitality generated by Project 410 is especially appreciated.

A session at the Prague Symposium, chaired by Bill Berry, was devoted to Late Ordovician global events. It was organized as part of the Global Ordovician Earth Systems (GOES) Program of the Subcommission. It seeks to encourage multi-disciplinary research focusing on linked global earth systems, and the Late Ordovician mass extinction and associated perturbations of earth systems is a perfect topic on which to focus activity. Bill Berry, the chair of the program steering committee, has been encouraging the creation of multidisciplinary working groups wherever possible to address the Late Ordovician events.

Remembrances

Each year brings news of the passing of another Ordovician star. The death in late 1999 of Valdar Jaanusson greatly affected me. I had the opportunity to study with Valdar as a graduate student, both at Ohio State University and the Swedish Museum of Natural History. All of us have had teachers and mentors who had particularly great influences on our lives, our education as scientists, and our future careers. Valdar Jaanusson was such a mentor to me. Studying with him was inspiring. The stimulation he provided came at a critical time in my development as a scientist, and I owe much of the success and pleasure of my career to his influence. I thank those who have written memorials for Valdar that are published in this newsletter.

I appreciate the confidence in my leadership of the Subcommission shown by the titular membership in electing me to a second term (2000-2004) as Chair. I was also elected to serve a concurrent four-year term (2000-2004) as 2nd Vice-Chair of the International Commission on Stratigraphy. I look forward to substantial progress over the next four years on the primary objective of the Subcommission - formal definition of global series and stages for the Ordovician System.

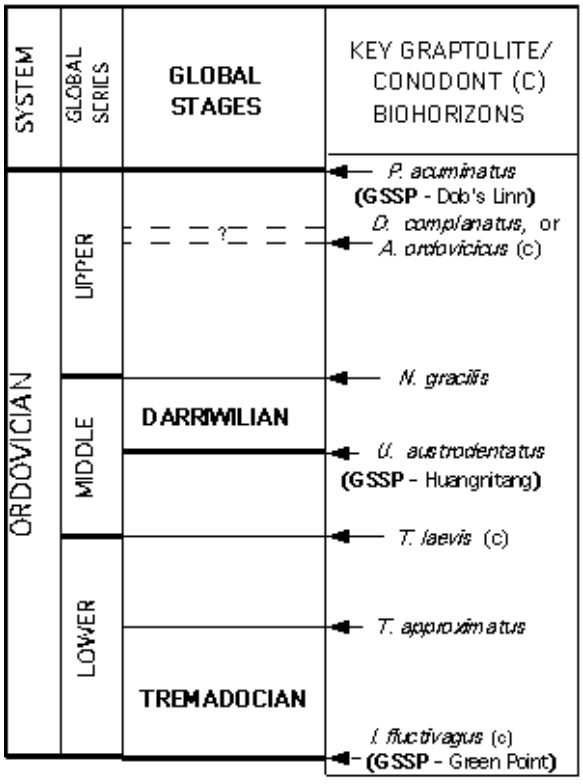
STAN FINNEY

SOS ANNUAL REPORT FOR 1999

1. Name of subcommission

Subcommission on Ordovician Stratigraphy (SOS)

2. Summary table of Ordovician subdivisions



3. Overall objectives

The Subcommission promotes international 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 procedures, 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).

c. To encourage, promote, and support research on all aspects of Ordovician geology worldwide and to provide outlets, *Ordovician News* and international meetings, for reporting results of this research.

d. To encourage, promote, and support interdisciplinary research on the Ordovician global Earth system, addressing topics that require high-resolution, global correlation.

4. Organization

a. ***Subcommission Executive***
Chairperson, S.C. Finney (U.S.A.)
Vice-chairperson, Chen Xu (P.R. China)
Secretary, G.L. Albanesi (Argentina)
18 other Voting Members
92 Corresponding Members

b. ***Cambrian/Ordovician Boundary Working Group:***
Chairperson, R.A. Cooper (New Zealand)
Secretary, G.S. Nowlan (Canada)
11 other Voting Members
57 Corresponding Members

c. ***Informal intra-Ordovician Working Groups***
Conveners of these groups are as follows:

(i) base of *approximatus* (base of second Stage of Lower Ordovician Series) - S.H. Williams, S. Bergström, C.R. Barnes

(ii) base of *laevis* (base of Middle Ordovician Series) - R.J. Ross, Jr., S. Finney, R. Ethington

(iii) base of *gracilis* (base of Upper Ordovician Series) - S. Finney, S.M. Bergström, Chen Xu, R. Fortey

(iv) base of *ordovicicus* (base of upper Stage of Upper Ordovician Series) - S. Bergström and C.R. Barnes

d. ***GOES Program*** - research committee
Secretary, W.B. N. Berry (U.S.A.)
4 other members

5. 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. The activities of some Subcommission members (titular and corresponding) have been supported in part by IGCP 410.

6. 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 386: Response of the Ocean/ Atmosphere System to Past Global Changes

Project 410: The Great Ordovician Bio-diversification Event

7. Accomplishments and products generated in 1999

a. In October, the GSSP for the base of the Ordovician System was approved by the Ordovician Subcommission by a vote of 16 yes, 2 no, and 3 abstain. Subsequently, the GSSP proposal was submitted to the International Commission on Stratigraphy, and the vote by the ICS is in progress.

b. The 8th International Symposium on the Ordovician System was held in Prague, Czech Republic, July 20-25, 1999. It was organized largely by Olda Fatka (Chair & Subcommission titular member) and Petr Kraft (proceedings volume editor). 147 participants represented 21 countries. 142 papers were presented in the technical sessions and published as short papers in the 534 page proceedings volume (Acta Universitatis Carolinae, Geologica, v. 43, no. 1/2), edited by Kraft and Fatka. A pre-symposium excursion examined Ordovician localities in Poland and Germany; a post-symposium excursion provided extensive study of classical Ordovician stratigraphy of the Barrandian basin of the Czech Republic. Three open meetings of the Ordovician Subcommission permitted extensive discussion of impending boundary stratotype decisions on the following levels: base of Ordovician System, base of second stage of Lower Ordovician, and base of Upper Ordovician Series. These were further discussed during two business meetings of titular members, where decisions were approved to proceed with postal ballots on base of Ordovician System and base of second stage

of Ordovician. Sixteen of 21 titular members were able to attend the symposium; 3 additional titular members from China were set to attend but difficulties in acquiring visas prevented them from doing so (see below). In addition, Dr. G.L. Albanesi was approved unanimously by titular members as Secretary of Ordovician Subcommission. S.M. Bergstrom was appointed to chair a committee to review titular membership of Subcommission. Finally, a delegation of Argentine colleagues proposed hosting the next (9th) International Symposium on the Ordovician Symposium in Argentina in 2003. This proposal was approved unanimously by the titular membership.

c. Substantial progress was made evalutating candidate stratotype sections for the base of the Upper Ordovician Series (=base of *N. gracilis* graptolite zone). In January, S. Finney visited the Calera, Alabama, USA section to recollect across the base of the zone, and Finney and S.M. Bergstrom visited the Fagelsang section in southern Sweden in June and examined museum collections from this section stored at Lund University. On the basis of this work, the biostratigraphy across the base of the *N. gracilis* zone was greatly refined. In papers presented at Prague and at the Geological Society of America Annual Meeting in Denver, USA, in October, Finney and Bergstrom propose the Fagelsang section as the Global Stratotype Section for this boundary level. This proposal received near unanimous informal approval at the Prague Symposium. A formal proposal is being prepared for publication and as a basis for a formal ballot of the Subcommission.

d. Titular member S.H. Williams recollected the Ledge section in western Newfoundland that he has proposed as the global stratotype for the base of the second stage of the Ordovician defined by the base of the *T. approximatus* graptolite zone. As a result of these collections, the biostratigraphy is substantially improved. Williams prepared a substantial report on the new results for distribution at the Prague Symposium. It served as the basis for extended discussions on the two candidate stratotype sections - the Ledge section and the Diabasbrottet section in Sweden. The titular members voted at Prague to proceed with a postal ballot to select the stratotype. This ballot will take place in late 1999.

e. An 89-page issue of *Ordovician News*, No. 16, edited by G.L. Albanesi, was published, and posted on the Subcommission's web page (http://ceor.seos.uvic.ca/ordovician/), newly created by G.L. Albanesi.

f. A Friends of the Ordovician Meeting was held in Denver, Colorado, on November 26, during the Annual Meeting of the Geological Society of America.

8. Problems encountered in 1999

Three titular members from China could not attend the 8th International Symposium on the Ordovican System in Prague because of extreme difficulties in obtaining visas for the Czech Republic.

Their institutions in China provided full support for travel expenses. They had purchased their tickets for air travel. However, the Czech embassy denied them visas. Through the extraordinary efforts of Czech colleagues, visas were finally approved days before the symposium was to begin, which was too late for Chinese colleagues to reschedule travel plans that they had been forced to cancel.

9. Work plan for 2000

a. *Ordovician News*, No. 17, assembled by G.L. Albanesi, will be published in the Spring 2000.

b. In December 1999 to January 2000, a formal postal ballot will be taken on two candidate stratotype sections (the Ledge Section in Newfoundland and the Diabasbrottet Section in Sweden) for the base of the *T. approximatus* graptolite zone (the base of the second global subdivision of the Ordovician).

c. In early 2000, a formal postal ballot will be taken on the Fagelsang section as the global stratotype for the base of the *N. gracilis* graptolite zone, as the base of the Upper Ordovician Series.

d. Following discussions and a vote of titular members by e-mail, a name will be selected for the lowest stage of the Ordovician System. The base of this stage, coinciding with the base of the Ordovician System and the Lower Ordovician Series, is defined on the FAD of the conodont *Iapetognathus fluctivagus* at the Green Point Global Stratotype Section, assuming that this GSSP for the base of the Ordovician is approved by ICS and IUGS. There appears to be a consensus to name this the Tremadocian Stage - the widely used British regional series that is comparable in biostratigraphic extent to the newly defined lowest stage of the Ordovician.

e. Following votes on the bases of the *T. approximatus and N. gracilis* graptolite zones, the Subcommission will need to decide on names for the stages these boundaries define.

f. Some titular members are unhappy with the Whiterock Narrows section in Nevada, USA, which is favored by many as the GSSP for the base of the *T. laevis* conodont zone, which will define the base of the Middle Ordovician Series. Accordingly, a field business meeting is scheduled for October 2000 for titular and

corresponding members of the Subcommission to carefully examine the Whiterock Narrows and other nearby sections. This field trip, sponsored by the Ordovician Subcommission, will be offered as a field trip for the Annual Meeting of the Geological Society of America that will be held in Reno, Nevada. Following this field excursion and the discussions it generates, the Subcommission will likely move forward with a formal postal ballot on this candidate stratotype section.

g. At the 31st International Geological Congress in Rio de Janiero in August 2000, the Ordovician Subcommission will sponsor a symposium titled "Paleontological, Stratigraphical, and Paleogeographical Relations Among South America, Laurentia, Avalonia, and Baltica during the Ordovician."

10. Anticipated work plan for 1996-2000

a. The Executive will continue to focus on defining boundary stratotypes for all Stage and Series subdivisions of the Ordovician System. Considerable progress is planned for 2000. Goals for formal ballots by the Subcommission are late1999 to early 2000 for the base of the *approximatus* Zone, early 2000 for the base of the *gracilis* Zone, and possibly late 1999 for the base of the *laevis* Zone.

b. The Subcommission will sponsor a symposium titled "Paleontological, stratigraphical, and paleogeographical relations among South America, Laurentia, Avalonia, and Baltica during the Ordovician" at the 31st International Geological Congress in Brazil, 6-17 August, 2000.

11. Potential funding sources outside IUGS

The Subcommission has no regular funding sources outside IUGS. Individual members of the executive, Voting Members and Corresponding Members must find their own financial support to carry out their research activities on boundary stratotypes and to attend various meetings (GSA-Friends of Ordovician, 8th ISOS-Prague). The Chair, who is also Chair and Professor of the Department of Geological Sciences at California State University, Long Beach, is able to obtain travel support from his university and from his research grants; yet his travel expenses necessary to develop proposals for boundary stratotypes and to conduct meetings of the Subcommission far exceed available funds. The Subcommission Secretary is a young scientist from a country with little support for professional activities. Accordingly, the Sub-commission has to provide substantial support for him to travel to important meetings.

12. Subcommission on Ordovician Stratigraphy Titular Members Meetings

I - 3.00 PM, 20 June 1999, Prague

Present: Aceñolaza, Albanesi, Barnes, Bergström, Bruton, Fatka, Gutiérrez-Marco, Huff, Owen, Paris, Williams (arrived late)

FINNEY introduces Guillermo Albanesi who has served as Acting Secretary for the last year and notes that the three titular members from China (Chen, Wang, and Zhou) could not attend because of visa difficulties, that Apollonov and Nicoll could not attend, and that Popov probably would not attend also because of visa difficulties.

Nomination of Officers. BERGSTRÖM reported the results of the nominating committee. At the direction of chair Finney, he formed a committee consisting of David Bruton, Henry Williams, and himself and conducted an election by e-mail ballots. Both Stan Finney and Chen Xu had expressed a willingness to serve for another four-year term as Subcommission Chair and Vice-Chair, respectively. Ballots were received from 19 of the 20 titular members (Apollonov did not reply). Of these, 18 were yes and one was no for Finney to continue as Chair; 19 were yes and zero were no for Chen to continue as Secretary. Their names have now been forwarded to the International Commission on Stratigraphy for a vote by the full commission.

Membership. FINNEY: According to ICS guidelines, the Subcommission is to rotate 1/3 of titular members every four years. The Ordovician Subcommission has tended not to make such substantial changes because it is important that titular members be very knowledgeable about boundary issues at hand, and many of the present titular members have extensive experience with the candidate stratotype sections and definitive fossil groups for the boundaries now under consideration. Four years ago, following the Las Vegas meeting, 1/3 of the titular members were replaced. This was accomplished by the retirement and resignation of several titular members (Baldis, Berry, Dean, Jaanusson, Nikitin, and Ross) and by the appointment of Aceñolaza, Fatka, Huff, Mitchell, and Nicoll. It is critical at this time that the Subcommission retain most of its present titular members, especially those of long standing, because of their knowledge of boundaries as we enter a time in which many will be decided. However, there are concerns that a

few titular members do not participate actively in current business. Accordingly, Stig Bergström has been asked to form a small committee that will consider over the next 2-3 months possible retirements and new appointments of titular members.
FINNEY: The corresponding membership list has not been revised and updated for at least 16 years. Many have expressed interest in becoming corresponding members, but their appointments have been delayed until such time as the membership list is revised. The list of corresponding members is basically the same as the mailing list published in *Ordovician News*, but many, in fact, have never been officially notified of their status as corresponding members. The Subcommission should reconsider the status of corresponding members and the role they should play in the Subcommission. The ICS guidelines state that subcommissions may appoint a reasonable number of corresponding members for the advice of voting members in achieving the assigned scientific tasks. That restricts corresponding membership. Should we follow it? What do titular members think?
BERGSTRÖM: How many corresponding members are on the list?
FINNEY: 92, one-third of the mailing list for *Ordovician News*.
BARNES: Corresponding membership is a difficult issue. *Ordovician News* is the main vehicle for Subcommission correspondence. The problem is with the criteria used to define corresponding membership; it may be unfair to exclude some while including others when the criteria are not clear. I favor leaving matters as they are and including everyone who expresses an interest is Subcommission activities.
BERGSTRÖM: It doesn't require any additional expense, does it?
FINNEY: No, and it may help many of those who are corresponding members to obtain travel support to attend Subcommission activities.
HUFF: Is there a problem with the way this is functioning now?
FINNEY: The problem I see is that we do not have a complete list of identified corresponding members. We have an old list with many names crossed out, and, as far as I know now, everyone on our mailing list is a corresponding member. We also have problems with the list of e-mail addresses. As we move towards ballots on boundary issues, much of our discussions and decisions will take place by means of e-mail. Yet, the addresses for many members are missing, incorrect, or outdated. Perhaps, we should consider as corresponding members anyone who is interested enough in sending information to *Ordovician News* and providing us with their addresses. I would hope that we can develop an up-to-date list of people identified as corresponding members and that we can send them letters notifying them of their status and stive to keep their addresses current. It is a big job that the Secretary must take the lead on. I recommend that when the Secretary sends out the call for contributions to *Ordovician News* he also requests whether or not the recipients desire to be considered for corresponding membership, and, if they do, that they be requested to provide current e-mail and postal addresses.

Ordovician News. FINNEY: Many of you downloaded issue No. 16 from the internet. We did print hard copies and sent them out to those who requested them. I congratulate Guillermo Albanesi for taking on the task of producing *Ordovician News No. 16* and posting it on the Web. We have problems with the cost of publishing hard copies of the newsletter, and the IUGS Executive is of the opinion that Subcommissions should place their newsletters on Web Pages, thus saving the cost of publication and postage. It is a great idea, except that a significant number of those receiving *Ordovician News* do not have adequate hardware or internet connections to access, let along download, the files, and some Subcommission members do prefer to receive a hard copy. The question facing the Subcommission is the cost of printing and postage of hard copies, which consumes half of the Subcommission's budget at a time when budgets are reduced each year.
HUFF: Perhaps we should restrict hard copies to only those members who cannot access the Web page?
WILLIAMS: The cost of printing hard copies for all members is not much more than the cost for only a few copies. I prefer to have a hard copy and would like to see the Subcommission continue to produce them.
FINNEY: The editor can take a stronger stand on what is allowed in the newsletter in an attempt to keep it to a reasonable number of pages. For example, the latest issue included a full report of IGCP 410 that was much the same as was printed in the previous issue.
BARNES: I feel that we have to go to the new style of operating. *Silurian Times* has gone completely to electronical distribution. Most of the newsletter is text, and can be transmitted by e-mail that almost all members can access. It is not as nice, especially with regard to figures and photographs, as a hard copy, yet an e-mail copy with provide the essential information. Maybe, we should charge those members who want a hard copy, for example, US$5.00/copy. The reality is that there is not adequate financial support for the Subcommission, and very few in our community are not going to be able to get an e-mail copy. In addition, by using electronic distribution, we can publish the newsletter more than once a year, especially when we are discussing boundary issues.

ALBANESI: From 250 members with e-mail addresses, I received 50 requests for hard copies. These were mainly from people who did not have access to the internet. *Ordovician News No. 16* was posted on the Internet, but it was not sent out as an attachment to e-mail as is done for *Silurian Times*.
HUFF: I suggest that the newsletter be not only placed on the Internet but also sent as an attachment to e-mail to all members with e-mail addresses.
ALBANESI: That would have been difficult for the most recent issue because the photographs and figures made the attachment too large (20MB for the last issue).
WILLIAMS: My concern is that we don't spend $3-400 to produce 50 hard copies.
OWEN: I think we ought to keep every issue that is produced on the internet for future ready access and as an archieve of Subcommission business.
FINNEY: I suggest that with the next issue, we notify everyone when it is posted on the internet, and we request a payment of $3.00 from those who wish to have a hard copy.

Subcommission Web Page. FINNEY: The Subcommission now has a Web Page through the efforts of Guillermo Albanesi and Chris Barnes. It is located on the server at the University of Victoria, Canada. The Subcommission should begin making use of its Web Page for discussions related to boundary issues.

IUGS Funding. FINNEY: IUGS is impatient with lack of progress on many boundary definitions, and is of the opinion that a lack of progress by a Subcommission reflects inactivity, which in turn raises the question of whether or not a Subcommission needs funding. As a result, the ICS executive has decided to reduce the budgets of all Subcommissions and then to reallocate the excess funds to those groups demonstrating a desire and need to make progress on particular boundaries. If we are particularly active, we can apply for that excess money to make progress on a particular boundary decision with the funds being used to fund a field business meeting, to send specialists for focused sampling of candidate stratotype sections, etc.

Pending Votes. FINNEY: There are two votes coming forward, the Cambrian/Ordovician boundary and the base of the second stage of the Ordovician at the base of the *T. approximatus* zone. The Subcommission should move forward rapidly with votes on these boundaries. The Prague meeting offers the opportunity to discuss thoroughly all matters related to these boundaries, and I would like to move forward with voting directly after the meeting. On Monday night, June 21, a two-hour open meeting will be devoted entirely to the Cambrian/Ordovician Boundary, in particular to the submission of the Green Point GSSP. It's time for the Working Group to present its case, and for all others to speak their minds either in support or in opposition to that boundary proposal. The purpose is for information for all Titular Members in order for them to make informed votes. Another matter is the name for the lowest stage of the Ordovician and the manner on which it will be handled on the ballot. Some would favor the name Tremadocian, but others may be opposed.
WILLIAMS: If the name Tremadoc is applied to a stage, it should have an -ian ending. The question it raises is whether to use the traditional name Tremadoc or the correct Tremadocian.
FINNEY: Can you find a rule or statute that addresses that issue?
WILLIAMS: I can't, which is why I see it as a problem.
FINNEY: It is a standard practice isn't it for most stages? Let's save further discussion for our meeting on Thursday. Roger Cooper presents the Green Point GSSP proposal in a paper on Monday, and then we will have two hours on Monday evening to listen to all arguments and comments for consideration. When we meet on Thursday, we will consided whether or not to move formal with a formal vote. The second boundary to consider is the base of the *T. approximatus* zone. Two stratotype sections have been proposed. Henry Williams will present a paper on Tuesday with new information on the Ledge section of western Newfoundland, and the two candidate sections will be the topic of two-hour Subcommission meeting on Tuesday evening.
BARNES: In voting on the GSSPs, it is best to not include on the ballot the name of the stages being defined. Some may favor the GSSP but vote against it because of disagreement with the name of the stage. The stage name should be decided by the Subcommission after the GSSP has been approved.
BERGSTRÖM: I would support that.
FINNEY: That can be done because it is the GSSP that must be approved by a postal ballot. The name of the stage can be determined through a simple majority vote by electronic mail.
The next boundary likely to be brought forward for a vote is the base of the *Nemagraptus gracilis* zone, the base of the Upper Ordovician Series. I just completed field work on the section at Fågelsång, Sweden, and on the basis of my results, Stig Bergström and I are ready to propose it as a boundary stratotype section. We hope to submit a proposal to a vote of the Subcommission in early 2000.

Other Subcommission Activities. FINNEY: The GOES program was approved at a Subcommission business meeting in St. Petersburg in 1997 to facilitate

interdisciplinary research on global problems in the Ordovician. A steering committee consisting of Bill Berry, Stig Bergstöm, Chris Barnes, and Ricardo Astini was appointed. As the leader, Bill Berry has been traveling to Europe and other areas encouraging Ordovician workers to form interdisciplinary groups that include not only stratigraphic paleontologists, but also sedimentologists, geochemists, paleoecologists, etc. to investigate global topics such as the late Ordovician mass extinction. He has recruited papers for a half-day session here in Prague. IGCP 410 is another program with considerable involvement of members of the Ordovician Subcommission. This program has been very active, generates substantial travel funds, which, for example, supported the attendance of many colleagues at this meeting. In addition, a substantial part of the program here in Prague, 40-50 papers, is related to Project 410.

Next Ordovician Symposium. FINNEY: At this meeting, our colleagues from Argentina will present a proposal to host the next, the 9th, International Symposium on the Ordovician System. I've heard of no other proposals. Guillermo Albanesi will distribute the proposal to all titular members today in order that they may read it before considering it at the next titular members meeting on Thursday at 12:30 pm, directly following the end of the morning technical sessions.
HUFF: I suggest that in your remarks during the opening session tomorrow that you make a final call for any other proposals to host the next Symposium.

International Geological Congress. FINNEY: There are two symposium on the technical program for the 31st IGC of interest to Subcommission members. Guillermo Aceñolaza and I are convening a session on Ordovician paleogeography, and Barry Webby is convening a session on Ordovician biodiversity. All titular members are encouraged to attend; we could have a Subcommission business meeting if enough titular members attend.

Subcommission Secretary. FINNEY: Guillermo Albanesi is asked to leave the room, while the position of Subcommission Secretary is discussed. Albanesi has done a tremendous job as Acting Secretary and editor of *Ordovician News* over the last year. After receiving strong support from many titular members, I appointed him as Acting Secretary, but not as Secretary because he was not a titular member. Although as Chair, I could have appointed him as a titular member and as Secretary, I preferred delaying the matter so that it could be brought forward at a formal business meeting. Therefore, I now recommend that Albanesi be approved as titular member and Secretary. Are there any objections?
BARNES: I would like to speak strongly in support of Guillermo Albanesi having worked with him closely as a PhD and his post-doctoral research supervisor. He is a very dedicated individual who has put tremendous effort in the Subcommission activities. He is keen, enthusiastic, does things well, and is very dependable. He represents good young blood that the Subcommission needs.
FINNEY: Hearing strong support and no opposition, I will appoint Guillermo Albanesi as a titular member and as Subcommission Secretary.

Meeting was adjourned at ca. 5.00 pm.

STAN FINNEY AND GUILLERMO ALBANESI

II - 12.30 PM, 25 June 1999, Prague

Present: Aceñolaza, Albanesi, Barnes, Bergström, Bruton, Cooper, Fortey, Fatka, Gutiérrez-Marco, Huff, Mitchell, Owen, Paris, Williams.

Primary agenda items are: 1) consideration of proposals for the 9th International Symposium on the Ordovician System, and 2) decisions on whether or not to proceed with voting on boundaries.

9th ISOS. FINNEY: The only proposal to host the next ISOS is from Argentine colleagues.
ALBANESI: All of you have been given a copy of the proposal, and I hope that you have had a chance to read it.
WILLIAMS: At the beginning of the week, it was my understanding that two important meetings would be scheduled for Argentina within two years time (the International Graptolite Meeting in 2001 and the 9th ISOS in 2003). It would be unfortuante because the travel expense would make it difficult for many people interested in attending both meetings. However, after informal discussions over the last few days, it is my understanding that the graptolite meeting will be rescheduled for 2003 and that the two meetings will follow one upon the other. That arrangement makes it much easier for many from outside South America to attend both meetings. As a result, I no longer have an objection.
BERGSTRÖM: Will there be joint field trips?
ALBANESI: Yes, between the two conferences. The 9th ISOS will be scheduled first. It also will have a pre-meeting field trip in the Precordillera. The Graptolite Conference will follow the field trip between the two

meetings, and it will be followed by a post-meeting field trip specifically for graptolite workers.
BERGSTRÖM: Do you have any idea about cost of the field trips at this stage?
ALBANESI: No. However, we will attempt to get support from the main academic institutions in Argentina for the field trips in order to reduce their costs. The 9th ISOS will be held in San Juan city and the Graptolite Conference in Salta city. The two sites are far apart, but the main field trip between the two conferences will travel between the two cities, providing the opportunity to see considerable Ordovician geology. The trip will take about seven days.
BARNES: I wish to express our gratitude to our Argentine colleagues for producing such a nice proposal. We always had such proposals in the past.
FINNEY received motion from floor to accept the Argentine proposal and it was seconded. FINNEY called for the vote, and the proposal was approved unanimously.

Green Point GSSP. FINNEY distributed letter from Wang Xiaofeng to all titular members. This letter requested that the vote on the Green Point GSSP be postponed. Finney requested comments on the letter.
COOPER: The letter makes two points. One is a concern about the synonymy of *Rhabdinopora parabola* and whether or not that point is valid in defining the C/O boundary. However, that has nothing to do with the boundary because the species is not used in defining the boundary. Whether or not the synonymy is correct, I suggest that that is not a reason for postponing the vote. The second point is a good point, and which is that we really should have had the conodont - *Iapetognathus fluctivagus* - described earlier. That is a fair criticism. Everyone would have preferred to have had that out much earlier. However, it is now published in a paper co-authored by five key conodont workers. So, its definition carries more authority than if it was described by only one person. Five key people are happy with its taxonomy. A second point I want to make is that, if the vote is postponed for that reason, then how long do you postpone the vote. How long do you want this to be in the open arena before we actually make up our minds? I felt that in general that, although the second point is a valid point, I don't think that it is a reason to postpone the vote.
BERGSTROM: I have heard from China from Chen Xu who feels that further studies are needed on the geographic distribution of this key conodont, but I certainly share Cooper's opinion that, if we postpone the vote for another 4 or 5 years, it doesn't make much sense really. You can't continue forever trying to find additional sections with this species; so I suggest that we proceed as soon as possible.
FORTEY: I would like to support that statement too. As I understand it, although it is first named in this recently published paper, it had actually been available as new species 1 for some time so it is no like it has suddenly appeared from nowhere. It has actually been in the literature for a while. And, I agree with Cooper that we cannot wait for every graptolite synonymy to be solved before we make this decision. Surely the time is right.
BRUTON: I had a long discussion with Jim Miller this morning about how he felt about that conodont, and he said he had no problem with that conodont.
FINNEY called for a motion to proceed with the decision to go forward with a postal ballot.
Motion was made and seconded.
ALBANESI: I am new to the Subcommission and have not followed the full history of the C/O Boundary Working Group, but I would like to mention that the occurrence of species in Argentina is the same as at Green Point. *Iapetognathus fluctivagus* occurs only a few meters below the first appearance of *R. parabola*. This is the first, unique section that confirms the Green Point succession in a deep-water environment.
COOPER: What is the depositional setting?
ALBANESI: It is platform to upper slope, and the section contains no shallow-water conodont species. Thus, it confirms that *Iapeognathus fluctivagus* is a deep-water species.
BERGSTROM: Where is the section?
ALBANESI: In the Famatina System. It is a nice outcrop, but it is located at 3500 meters.
FINNEY: We have a motion and second, thus we will now vote on whether or not to proceed with a postal ballot.
COOPER: I would like to speak to the motion. As we move to a formal postal ballot, we should have some contingency in mind should that vote fail. If the Green Point section does not receive approval, what do we do then?
FINNEY: That's is a procedural matter that we should discuss after we vote on the motion.

The vote was taken , and it was unanimous to proceed with the postal ballot. Those present and voting were: Aceñolaza, Albanesi, Barnes, Bergström, Bruton, Cooper, Fatka, Finney, Fortey, Gutiérrez Marco, Huff, Mitchell, Owen, Paris, and Williams.

FINNEY: I have certain concerns. If the boundary is not approved, we are in a very difficult situation. I have concerns that have not been answered, mainly with regard to Lawson Cove. I would like to ask a couple of questions of Cooper on why Lawson Cove did not receive a majority vote. Why was it not selected? This question is very important should Green Point be

rejected. Is Lawson Cove so deficient that it could not be considered either? During our discussions on Monday, we focused on whether or not Green Point should be approved. We didn't discuss Lawson Cove because it is not the vote before us. But, I would like to know why it was rejected.

COOPER: We didn't canvas the Working Group voting members to tell us specifically what it was they didn't like about the Lawson Cove section. My impressions from talking with various members were that there were three reasons. First, a lot of people were concerned since the early 1980s that there must be interruptions in the continuity of sections in the Ibex area. They were deposited on a shallow carbonate platform during a time interval in which there were strong changes in sea level, and the sections were deposited in a few meters of water depth. We originally were thinking with regard to the Lava Dam section, but the same would apply to all sections in the Ibex area, including Lawson Cove. They all have the same conodont succession but they were all affected by the same sea-level events. We never really got into that question very much because that section was dismissed. The second reason is that the thermal alteration is too high to get paleomagnetic signals. And the third reason was that it would make it difficult to recognize the boundary in graptolitic shale successions. It is the reverse of the problems we have at Green Point. With Green Point, we have difficulty correlating into shallow-water sections. At Green Point, graptolites and conodonts do occur together, and for many members that was best, if possible, to get a section that allowed correlation with both groups. I think that was the main issue that made many voting members reject Lawson Cove.

BERGSTROM: I have not been on the Working Group, but I might comment on the conodonts. These conodonts you find at Lawson Cove are strictly tropical forms that have never been seen in most cases outside the tropical belt. So they are not useful, for example, for correlation into Baltoscandia or peri-Gondwana or areas like that at all. The zonation that Miller recognized cannot be applied outside of these tropical belts.

BRUTON: This morning, Jim Miller brought up to me the question of a fault in the Green Point section, which we had seen together during a field meeting, and which he discussed in an earlier report as significantly offsetting the section. But, in my opinion it represents minor bedding plane slip; it is trivial.

WILLIAMS: When I rermeasured the section, I did it with my nose on the rock, literally. There might be minor bedding plane slip. However, there may be confusion between it and another fault that is obvious to anyone and can be readily avoided in measuring the section.

OWEN: So you are saying that there is no fault close to the boundary at all.

WILLIAMS: Correct.

FINNEY: The motion to proceed with a postal ballot has been approved. The ballot will be sent out as soon as we return home. It will be only for the Green Point GSSP and to vote yes, no, or abstain. The GSSP will define not only the base of the Ordovician System and the base of the Lower Ordovician Series, but also the base of the lowest Stage of the Ordovician. But the lowest Stage will not have a name attached to it. There is a difference of opinion among the voting members on the name that should be given to the lowest stage, and we don't want that difference to affect consideration of the Green Point GSSP. To be approved, it will require a 60% majority. If it does, I will inform all titular members and then we will proceed with selection of a name for the lowest stage. I will ask for input first from Cooper, as chair of the boundary working group. We will distribute to all titular members Cooper's suggested name with his justification for use of that name. Discussion will then follow between all titular members by e-mail; and all titular members are encouraged to discuss this name or to propose other names. Discussion by e-mail will continue until I feel that we are ready for a vote on the name. Then we could vote electronically. Voting on a name is not the same as voting on a GSSP; a simple 50% + 1 majority is all that is needed. As soon as that is done, I will contact Cooper requesting that he make any necesssary revisions to the proposal, and then we will send it forward to the ICS.

BERGSTROM: If we have an e-mail vote on the stage name, it is best that we have a paper copy from everybody on file, in case of some dispute or questions in the future. One could print out the e-mail messages that include the votes from each member.

COOPER: In the working group, we never got into a discussion of the name of the lowest stage, and, if I proposed a name, I couldn't say that I would be representing the opinion of the working group. My opinion would be personal.

FINNEY: Because you led the working group to a decision, I would prefer if you would make the first proposal of a name, as a means of starting discussion among the voting member, even it is your personal opinion.

MITCHELL: I think we need more discussion on what happens if the Green Point GSSP is not approved.

FINNEY: Yes, let's do that. This is our last chance for discussion as a group, and it is a critical matter.

BARNES: I am heavily biased, and with regard to the Ordovician/Silurian boundary I was in a position, similar to Jim Miller's. In this case, I want to re-emphasize what Mike Bassett said (in meeting on June 21st). In the

past, votes from boundary working groups went directly to the ICS. They were not considered by Subcommissions. And, in this case it would be a real embarrassment considering the tremendous duration that the working group has gone through in considering different sections. Working Group I first could not arrive at a decision, and after many more years, Working Grouip II finally arrived at a decision. To reject the work of these colleagues after so long a duration should be embarrassing to the Subcommission. After all the extensive discussions, at Las Vegas, here, and at all the working group meetings, with regard to the procedures that we followed, how could we be fair if we do not come to a decision? We all belong to faculties, senates, committees, companies and other groups where we must deal with issues and where there are disagreements, but where at some point we must reach decisions. I think it is importat that this body, the Subcommission, does achieve a 60% majority vote.

MITCHELL: I am uncomfortable with the argument that Barnes just made. I recognize that it is very important to come to a decision and establish a boundary. But, individually, we must make a decision based on what we think is right with regard to the science, not on the history of how long it has been or on how badly we need a boundary. If there is anything that anyone might call embarrassment or shame, it hasn't anything to do with the people in this room who vote; it is with the steps that led up to the vote.

BARNES: You have a full record of 24 years of history of study and analyses.

FINNEY: For each of us the vote is very personal and we have to weigh many factors. We must exam the evidence, but there are differences of opinion on the evidence and its interpretation. Most of us were not on the working group, and yet there were a large number of colleagues who were on both working groups and put in tremendous time studying the sections. Those were colleagues specially selected for their expertise, and we have to some degree evaluate the work of our colleagues. Are we comfortable with their work or not? They came to a decision based on established procedures and extensive study and consideration of many sections. In addition, we are only considering the Green Point section, yes or no, relative to the standards of a GSSP. Yet in light of the fact that so many other sections were studied, what is the alternative to Green Point? We are not to consider alternatives in our vote, but it is a major influence on our individual decisions. If one were to vote against Green Point, then one must have some consideration of an alternative. Considering that no section is perfect, then would one of the other candidate sections be adequate or would we need to search for other sections in the world.

WILLIAMS: Considering what Bergstrom said earlier about Lawson Cove and what has been said about Dayancha, if the Green Point vote fails, we should forget the Cambrian/Ordovician boundary because no one is going to be prepared, the ICS will not support us, to start the process again. It would have to start from square one with reconsideration of criteria for boundary definition. Secondly, neither I nor anyone else would be prepared to spend any time on it because we've done so much in the past three years. We have others things to do.

FINNEY: We would then go back to Cambrian and Silurian systems without the Ordovician.

(Laughter)

FORTEY: What is the formal procedure, what would happen if there is a no vote?

FINNEY; I don't want to even think about it. If the working group felt that they had confidence in other sections, then they could be brought forward and considered relatively quickly. But, whether or not they do, I don't know. And, if they don't, do we search the world for another section, or throw out the Ordovician. Sedgwick would win.

COOPER: If Green Point was rejected, I don't think I could get the vote of a third of the working group to approve the Lawson Cove section. We have gone through this long process that has looked at all these sections in great detail, and the working group members, and a few other corresponding members, are the ones most familiar with them now. If their decision is overturned by the Subcommission, I don't think that many of them would want to participate further, I, for example, have had my full of it, and a new group would have to be assembled. That should not determine how individuals vote on the GSSP. However, I emphasize that if we have long known and considered the deficiencies of the Green Point section, as well as those of the other sections. When we make our vote, we will fool ourselves, if we hold any of these sections to a theoretical standard. That is a recipe for rejecting every candidate we put up because we do not have a good ideal candidate section anywhere. And what we must do is take the best section along with all its faults. We must do it and make the best of it, even if it may not measure up to what we think is necesssary for the section. Make you vote from the position of is this the best section that we can find in the world. If not, if you think there is a better candidate somewhere, that is a good reason to vote no.

MITCHELL: Mike Bassett asked us to think about providing a positive way forward should the vote fail. What we just heard from Cooper is that with the same set of criteria that they were given there isn't another section that they could put forward, even if they could stay with it.

FINNEY: You mean a candidate that could get a majority of the present working group.
MITCHELL: Yes. And, so the standard that has been placed around the neck of any of these sections, is the standard that has been set by the ICS - all the things that a good GSSP should have, and it is a long list. On top of that, the C/O boundary has been saddled with the need to have a perfect record for two zonally significant groups - conodonts and graptolites in the same section. And, so one positive suggestion we could make would be to reconsider that last criterion. Maybe we've put too many criteria on the boundary decision, and the experience has shown that you can't meet all those criteria in any section that they have been able to find. A positive way forward would be to recommend that you pick either one or the other of the fossil groups. And try again from there, if you have too. I'm not suggesting that this is a reason for voting no on Green Point. But, were we to wind up in that situation, that would be some way for hope for resolution.
BRUTON: I think that would be defeating the objective of stratigraphy. The GSSP should be based on every kind of evidence we have. It was regrettable that we gave up trilobites, for example, in favor of conodonts which have turned out to be such a problem.
BARNES: Stratigraphy is a practical science, and full of compromises. I agree with you that the list of requirements put forward by ICS is demanding, but it did not require us to meet all of them. We have to be sensible; we have to try to recognize the imperfections of the stratigraphic record. In the case of the Ordovician System, we have the case of two outstanding zonal fossil groups that are keys to correlation, and it would make huge sense to have a stratotype section with both groups.
FORTEY: Let's not make too much of the deficiencies of Green Point. After all, we have graptolites, we have conodonts, and we just heard for the first time that this particular conodont, the one we want, has gotten into Gondwana, which resolves one of the problems. And, it seems to me that this section is better, not worse. So, I feel that we should feel confident about it.
ALBANESI: If Green Point is approved and after 8 years we find the deficiencies are too great, the GSSP can be revised.
FINNEY: Are there any other questions or comments? Hearing none, we will move on to other items on the agenda.

Stratotype Sections for Base of *T. approximatus* Zone. FINNEY: We've considered two candidate stratotype sections for the base of the *T. approximatus* zone, which defines the base of the Second Stage of the Ordovician System. The question before us whether or not to proceed with postal ballots, which would include three rounds of voting: one to vote between the two sections in order to determine which receives a majority vote (50% or greater), a second round to vote yes or no on the section that got the majority on the first round (greater than 60% majoirty need for approval), and third round, informal, to pick a name for the unit that the boundary defines. What is the feeling of titular members on whether or not to proceed with the vote?
BERGSTROM: Can we pick a name for the unit before we know what the top will be?
WILLIAMS: Well we have decided to use the first appearance of *Tripodus laevis*, haven't we?
FINNEY: We have a candidate stratotype section for that boundary level but discussions on the GSSP have not proceeded very far. We had preliminary discussions at Las Vegas, but I know that on the American side there is more work to be done before a formal proposal can be submitted, and Richard Fortey, who has been working on the section, has raised concerns. I think that it would be 1.5-2 years before a formal proposal is submitted and voted on. But, on the other hand, we gave a name to the Darriwilian stage without having its upper boundary formally picked, believing that its uppermost boundary would be the biohorizon defined by the base of the *N. gracilis* graptolite zone.
WILLIAMS: What is the status of Lower, Middle, and Ordovician Series? If you are saying that the base of Middle Ordovician is up for grabs, which apparently is what you are saying with regard to defining the base of the next stage, then we can reverse it and say that might we use the base of the Darriwilian as the base of the Middle Orodivican, in which case Arenig has some potential as the name for the second stage. If not, we probably shouldn't be using it. So, I agree with Bergstrom that if we don't know where the top is going to be at this stage, we can't consider a name.
FINNEY: At Las Vegas we had a vote on five horizons to serve as stage/series boundaries for subdividing the Ordovician System and whether to proceed with the goal of finding suitable stratotype sections for those boundaries. I think we want to ramain on that track, until we drop a horizon due to an inability to find and approve a suitable stratotype. If we throw out the decision to follow that track, who knows what direction we are going to go. And I would rather have us moving forward on a plan on which we voted a strong majority, then to go off in who knows what direction.
WILLIAMS: Right, then in that case we are using the base of *T. laevis* for the upper boundary of the second stage.
FORTEY: We should not let this question of the upper horizon interfere with a vote on candidate stratotype sections for the base of the *T. approximatus* zone, which has a high degree of concensus as a stage boundary.

And, we have had two excellent presentations on two very good sections. We don't have to tie in the nomeclatorial decision with the GSSP vote.
FINNEY: My choice would be to separate the votes as we did with the base of the Ordovician.
FORTEY: So we can perhaps proceed now with the stratotype sction vote and postpone the name until an upper boundary is selected.
COOPER: We should vote on the level, and in the meantime we can number stages 1, 2, 3, etc. They would still be very useable.
FINNEY; The motion is to move forward with voting on the candidate stratotype sections. It was seconded. Any further discussion?
WILLIAMS: My general impression from the discussions the other night is that both sections arepretty good and are equally deficient, but in different ways. Both of them basically give us a very strong chance we have the base of *T. approximatus* with no sedimentological break at the boundary. One can argue whether the faunal break below the boundary at Cow Head or Diabasbrottet is a problem, but I don't thing that there are any big sedimentological breaks in either section. So I think we should go ahead with a vote.
FINNEY: Motion approved unanimously.
BARNES: I request that when ballots go out they include a summary of the discussions that took place here.
FINNEY: Guillermo Albanesi and I will transcribe these minutes and those of the open discussions and send them to all titular members. Before doing so, we will have them reviewed by both proponents of both candidate stratotypes (Williams and Bergström) to ensure that no one is misquoted or misrepresented.

Stratotype Sections for Base of *N. gracilis* Zone. FINNEY: Stig Bergström and I will present two papers this afternoon on two candidate stratotype sections in China that we visited over the last couple of years. Before coming to Prague, I spent a week in Sweden examining core material from across the boundary interval and the Fågelsång section, and we've reviewed material from a section in Britain sent to us by Richard Bettley. Based on these studies, we will be recommending Fågelsång as the stratotype section. We hope to bring that proposal before the Subcommission in early 2000.

Base of Hirnantian. MITCHELL: Chen Xu and Rong Jia-yu have been working on the graptolite and brachiopod faunas of the Wufeng Formation, and they would like to propose a boundary stratotype for the Hirnantian in the Yichang area. However, the way in which the Subcommission has been subdividing the Ordovician, the Hirnantian would be a substage. As far as we know, there is no procedure for boundary stratotypes for substages, and we wonder if the Subcommission would be interested in doing so because it is an particularly interesting and important interval in the history of life. And just as for stages and series, it would be helpful to have stabilized nomenclature for substages. What is the opinion of the titular members?
WILLIAMS: Where would they draw the base?
MITCHELL: I will present the case of the base in a paper this afternoon, and it is at the base of the *N. extraordinarius* Zone.
FINNEY: The Silurian System has global substages.
WILLIAMS: I think we should at least get series done before we consider substages. I think that it is bad enough that we have stages within yet to be defined series.
MITCHELL: I would agree with you, except in this case our colleagues have put considerable work into this potential boundary level and are willing to dedicate much more work to it.
FINNEY: My concern is with the extent of the uppermost stage. We haven't set its lower limit yet, and we may find that the lower part of the uppermost stage once it is defined will consist of very little, perhaps less than one graptolite zone below the Hirnantian. I don't think that is likely, but it is still of concern.
WILLIAMS: My concern is with the upper boundary of the substage as well. As defined, the top of the Ordovician, which is also the top of its highest stage and, if desired, substage, is defined on *ascensus* Zone, but the Chinese are still placing it at the base of the *acuminatus* Zone above that. That is important because if they want the Hirnantian as a substage at the top of the Ordovician than they have to accept that they top of that substage is the Ordovician/Silurian boundary as defined at Dob's Linn.
MITCHELL: I feel that it is irrelevant where you put the top; it's the base that defines the unit. I also think that the position for the Ordovician/Silurian boundary in China is only one person's opinion and that other Chinese colleagues (including Chen and Rong) place it at the base of the *ascensus* Zone.
WILLIAMS: The glaciation interval that the Hirnantian is taken to represent may have begun long before the Hirnantian and was likely diachronous.
MITCHELL: Thus, the need to define stable units by which to evaluate diachroniety.
FINNEY: Why not use the existing graptolite zones that have a high level of precision?
BARNES: We already have many stages that are in use even though they have not been approved by any Subcommission. Westrop, for example, defined several Cambrian stages, and stages have been defined for the Ibexian and Whiterockian North American series, and Hirnantian has long been used as a stage name. An important question is should the Subcommission be

directing its energy towards this issue at a time when it is making great progress on series and stage level definition. My feeling is that we ought to proceed in a logical order and that we need to focus on the series and stage level issues at this time.

Meeting was adjourned at ca. 2.00 pm.

STAN FINNEY AND GUILLERMO ALBANESI

INTERNATIONAL SYMPOSIA AND CONFERENCES

Short papers of the 8th International Symposium on the Ordovician System (Prague, June 20-25, 1999)

QUO VADIS ORDOVICIAN?

ACTA UNIVERSITATIS CAROLINAE
Geologica
Vol. 43, No. 1/2

Edited by P. KRAFT AND O. FATKA

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DATABASES

THE FOURTH BALTIC STRATIGRAPHICAL CONFERENCE
27-30 September, 1999.
Jurmala, Latvia

The Fourth Baltic Stratigraphical Conference in Jurmala (Latvia) 27-30 Sept. was organized by the Institute of Geology, University of Latvia; Faculty of Geographical and Earth Sciences, University of Latvia; State Geological Survey of Latvia, Latvian Museum of Natural History and Baltic Stratigraphical Association. It was a joint meeting of the Baltic Stratigraphical Association and the IGCP 406 Project. The meeting was followed by a two-day field trip to the Devonian sections of Latvia. Eleven of the 71 abstracts presented in the corresponding publication deal with different problems of Ordovician stratigraphy and faunas in Baltic areas.

LINDA HINTS

IGCP PROJECT 406: CIRCUM-ARCTIC LOWER AND MIDDLE PALAEOZOIC VERTEBRATE PALAEONTOLOGY AND BIOSTRATIGRAPHY CONFERENCE

"Palaeozoic Pan-Arctic Tectonics and Evolution of Basins and Faunas" (Capv-2000)
12-15 July, 2000
Syktyvkar, Russia

First Circular

Invitation
All interested Palaeozoic workers are invited to attend the IGCP Project 406 conference (CAPV-2000) in Syktyvkar, Russia, 12-15 July 2000. The conference will be devoted to the evolution of Early and Middle Palaeozoic faunas and sedimentary basins, and palaeotectonical development of the Circum-Arctic regions.

Programme

Excursions
Two excursions (pre-conference and post-conference) are planned:
1. *Pre-conference excursion: 7-11 July.*
The excursion will take the participants to South Timan, where they can study a number of Late Devonian sections exposing different strata (including the type section of the well-known "Domanic facies", and several fish-bearing strata).
The maximum number of participants is 30-40.
2. *Post-conference excursion*: *16-26 July.*
This excursion takes the participants to the Lower and Middle Palaeozoic sections in the Subpolar Urals, Kozhym River. Ordovician, Silurian, Devonian, Carboniferous and Lower Permian strata, representing various sedimentary environments, can be examined. At the end of the excursion the participants will visit Ukhta, where several core sections (exposing Lower and Middle Palaeozoic strata) from the Pechora Syneclise will be demonstrated at the Timan-Pechora Scientific Research Centre.
The maximum number of participants is 20.

Scientific sessions
12-15 July
Sessions will be held in Syktyvkar, in the Institute of Geology, Komi Science Centre, Uralian Division of Russian Academy of Sciences.
The main topics of presentations will be:
A. Palaeontology and biostratigraphy;
B.Sedimentology and sequence stratigraphy;
C. Tectonics and basins.
Both, talks and posters are welcome.

Abstracts
Extended abstracts in form of short papers should be submitted before 15 April, 2000. The contribution (in English) should not exceed six A4 pages, including references and illustrations. However, as a guide and for consistency, it is suggested that the text be submitted in font size12 Times New Roman, double-spaced, with genus and species names in italics. The abstract title and the author(s)' name(s) (in capital letters) should be followed by the address(es) of the author(s). The references should be given according to the examples below. The maximum size for drawings and photographic plates is 160x220 mm. (Note: only one photographic plate by article). The line drawings can be sent as computer files (.tif or .pcx format bitmaps), photo-plates only as high-quality hard copies. Abstracts will be published in special publications of the Ichtyolith Issues.

Examples of references
Journals:
TRAMMER, J. 1989. Middle to Upper Oxfordian sponges of the Polish Jura. - *Acta Geologica Polonica*, 39 (1): 49-91.
OVNATANOVA, N. S. & KONONOVA, L. I. 1984. Correlation of the Upper Devonian-Lower Tournaisian beds in the European part of USSR by conodonts. - *Sovetskaya geologiya*, 8 (2): 32-42 [in Russian].
Books:
WILSON, J. I. 1975. Carbonate facies in geologic history, 471 pp. *Springer*; Berlin-Heidelberg.
Book chapter:

FLUGEL, E. & STEIGER, T. 1981. An Jurassic sponge-algal buildup from the Northern Frankenalb, West Germany - In Toomey, D. F. (*ed*.): European fossil reef models. *SERM Special Publication*, 30: 371-397.

Symposium Volume:

ODIN, G.S. 1984. Geochronology of the Jurassic time: status in 1984. - In Michelson, O. & Zeiss, A. (*eds*.). International Symposium on Jurassic Stratigraphy: 767-776.

Abstracts:

KOLESNIK, L. & IVANOV, A. 1994. Famennian conodonts and ichthyofauna from two facial zones of the Polar Urals. - Abstracts of the Moskow Symposium "Devonian Eustatic Changes of the World Ocean Level" - 9-22.07.94, Moskow – Ukhta: 19.

Estimated costs

Considering the prices at the moment, the estimated costs are as follows:

registration fee: $50 (includes excursion guide, abstract volume, programme, coffee during the sessions, and ice-breaking party);

accommodation in Syktyvkar: $10-30 per person per day;

conference dinner: $30;

pre-conference excursion to South Timan: $180;

post-conference excursion to the Subpolar Urals: $490.

An attempt will be made to reduce prices for students and to provide some financial support to other participants. Also, we are trying to find sponsors. Any suggestion concerning sources of financial support will be greatly appreciated.

Preliminary registration

In order to know the number of interested persons and to start with organization, please fill in the Registration Form included. The Second Circular will be sent only to those who have pre-registered.

Contact address

Anna Antoshkina
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Uralian Division of Russian Academy of Sciences
54 Pervomayskaya St.
167610 Syktyvkar
RUSSIA
Fax: 821 2 425 346
e-mail: Antoshkina@geo.komi.ru

Pre-registration form

Forename: Initial(s):
Surname:
Title:
Sex (M/F):
Institution:
Address (street): City:
Postal code: Country:
State:
Phone:
Fax:
e-Mail:

Please underline
I shall attend yes probably
and intend to be accompanied by one two more accompanying persons
I intend to give a lecture yes no
I plan to present a poster yes no
I intend to submit an abstract (abstracts) entitled
I intend to join the pre-conference excursion to South Timan yes no
I intend to join the post-conference excursion to the Subpolar Urals yes no
I need financial support yes no
I need an official invitation yes no

Signature

[Accommodation will be specified in future]
For additional information please contact A. Antoshkina.

Pre-conference excursion: South Timan, Ukhta Region
6-12 July, 2000

The pre-conference field trip will be held in the Ukhta Region, South Timan. The excursion starts in Ukhta on 6 July. There are several possibilities of reaching Ukhta: by plane directly from Moscow; by train from Moscow, St. Petersburg or Syktyvkar; by bus from Syktyvkar.

The cost of the excursion ($180) includes transport and meals during the field-trip, accommodation in the field-camp, and travel to Syktyvkar after the excursion. The first three nights (from 6 to 9 July) participants will stay in Ukhta. The hotel and students hostel in Ukhta are available at the following prices:

single room in hotel "Timan": $15 per night,

single room in students hostel: $20 for the full period in Ukhta, bed in a double room in students hostel: $10 for the full period in Ukhta. On 9 July the participants will move to a field-camp on the Lyaiol' River where they will live in tents.

Itinerary:

6 July: assembly in Ukhta and registration

7 July (first day of field trip)

Stop 1: Ukhta River, Vodnyj Village

Stop 2: Chut' River
Stop 3: Domanik Creek
8 July (second day of field trip)
Stop 4: Podgornyj quarry
Stop 5: Sirachoj road cut
Stop 6: Bel'gop quarry
9 July (third day of field trip)
Stop 7: Izhma River
Stop 8: Yarega oil mine;
travel to the camp on the Lyaiol' River
10 July (fourth day of field trip)
Stop 9: Lyaiol' River
11 July (fifth day of field trip)
Stop 10: Sed'yu River
12 July: Travel from Ukhta to Syktyvkar

Deadlines:
1 February for registration to the excursion
15 March for transfer of money

Brief description of the localities:
A full complex of Frasnian deposits represented by a third order cycle [Highstand (HST: reefs, backreef and basin facies), Transgression (TST)and Lowerstand (LST) System Tracts] and containing rich faunal assemblages will be studied.
Stop 1: Ukhta River, Vodnyj. Sections of Lower Frasnian shallow water clastic and carbonate deposits with abundant ostracodes, brachiopods, crinoids, conodonts, vertebrates (psammosteid agnathans, acanthodians, placoderms, chondrichthyans and sarcopterygians), fossil plants.
Stop 2: Chut' River. Sections of Lower-Middle Frasnian shelf carbonates and deposits of basin facies (condensed sequence of classic "Domanik Facies") represented by cherts, silicious limestones and oil shales with abundant ostracodes, ammonoids, dacryoconarids, conodonts, vertebrates (placoderms, chondrichthyans and sarcopterygians).
Stop 3: Domanik River. Sections of Middle Frasnian basin deposits (condensed sequence of classic Domanik Formation) represented by thin-bedded carbonate shales with large carbonate nodules, and silicious limestones with ostracodes, ammonoid and nautiloid cephalopods, dacryoconarids, arthropods, bivalves, conodonts, vertebrates (placoderms).
Stop 4: Podgornyj quarry. Sections of Upper Frasnian clay and clastic deposits of progradation terrace (LST), of bioclastic limestones and clays (TST) with corals, ostracodes, abundant brachiopods, bryozoans, crinoids, vertebrates (antiarchs and sarcopterygians), plant remains, as well as various trace fossils.
Stop 5: Sirachoj quarry. Sections of Upper Frasnian back-reef deposits (HST) with numerous and diverse corals and stromatoporoids, ostracodes, gastropods, brachiopods, vertebrates (placoderms).
Stop 6: Bel'gop quarry. Sections of Upper Frasnian back-reef deposits (HST) with numerous and diverse corals and stromatoporoids, ostracodes, gastropods, bivalves, brachiopods, nautiloids, conodonts, vertebrates (arthrodires, dipnoans).
Stop 7: Izhma quarry. Sections of Lower Famennian carbonate deposits with abundant vertebrates (antiarchs, porolepiform and dipnoan sarcopterygians). In this locality also remains of tetrapods have been found.
Stop 8: Yarega oil mine. In a 600 m deep shaft highly viscous oil is produced (using steam heating) from the Middle Devonian sandstones
Stop 9: Lyaiol' River. Sections of Upper Frasnian deep-water deposits. These deposits are interpreted as being formed in conditions transitional from Highstand to Lowstand in shelf depression. Abundant ostracodes, diverse and numerous ammonoids, arthropods, brachiopod coquinas, conodonts, vertebrates (psammostiid agnathans, various placoderms, chondrichthyans, dipnoan and porolepiid sarcopterygians), and plant remains are characteristic of these sediments.
Stop 10: Sed'yu River. Sections of Upper Frasnian fore-reef, reef and back-reef (with small bioherms) deposits with calcareous algae, corals and stromatoporoids, ostracodes, gastropods, bivalves, brachiopods, and rare vertebrates (antiarchs, sarcopterygians).

Post-conference excursion: Subpolar Urals, Kozhym River
16-26 July, 2000

This excursion will focus on the Ordovician-Early Permian carbonate sequences in the Subpolar Urals (Kozhym River basin), but also the Upper Devonian sequences in South Timan will be visited. The cost of the excursion will be $490 [including the transport from Syktyvkar to Inta, from Kozhym to Ukhta and during the excursion, accommodation, meals, etc., (accommodation in Ukhta excluded)]. On the Kozhym River the participants will live in field-camps (in tents), during the last three ninghts they will stay in Ukhta. In Ukhta, hotel and students hostels are available at the following prices:
single room in hotel "Timan": $15 per night,
single room in student hosting: $20 for full period of trip, bed in the double room in students hostel: $10 for full period in Ukhta.

Itinerary:
16 July: departure from Syktyvkar to Inta by train
17 July (first day of field trip) Arrival to Inta, departure for the Kozhym River by car (camp 1 is
located close to the Tavrota section)
Stop 1: Kozhym River, Tavrota section

18 July (second day of field trip)
Stop 2: Kozhym River, Balban'yu section
19 July (third day of field trip)
Stop 3: Kozhym River, Yarenej Brook
In the evening the group will move to camp 2 (located cose to the mouth of the Ust'Durnayu River)
20 July (fourth day of field trip)
Stop 4: Kozhym River, Marshrutnyj Brook
21 July (fifth day of field trip)
Stop 5: Kozhym River, Ust' Durnayu River
In the evening of this day the group will move to camp 3 (located close to the mouth of the Syv'yu River)
22 July (sixth day of field trip)
Stop 6: Kozhym River, Syv'yu River
Stop 7: Kozhym River, Syv'yu River
23 July (seventh day of field trip)
Stop 8: Kozhym River, Nortnechyael' Brook
Stop 9: Kozhym River, Nortnechyael' Brook
Afternoon transportation to the Kozhym railway station and by train to Ukhta.
24 July (eighth day of field trip)
Stop 10: Domanik Brook
Stop 11: Izhma River
25 July (nineth day of field trip)
Stop 12: Yarega oil mine
26 July (tenth day of field trip)
Stop 13:examination of core-sections in Ukhta
In the afternoon departure.

Deadlines:
1 February for registration to the excursion.
15 March for transfer of money.

Brief description of the localities:
A sequence of Ordovican-Lower Permian strata represented by various (lagoonal, shallow- and deep-water shelf, reef and condenced basin) deposits, containing rich faunal assemblages will be examined.
Stop 1: Kozhym River, Tavrota River. Sections of Upper Ordovician shallow-water carbonates with ostracodes, crinoids, brachiopods, conodonts, stromatoporoids.
Stop 2: Kozhym River, Balban'yu River. Sections of Upper Ordovician and Upper Wenlock-Ludlow reef deposits, and Upper Ordovician-Lower Silurian deep-water deposits with abundant corals, problematic hydroids, heliolitids, brachiopods, pelecypods, crinoids, conodonts, bryozoans, sponges, algae, thelodonts.
Stop 3: Kozhym River, Yarenej Brook. Ordovician-Silurian boundary: shallow-water carbonates with abundant brachiopods, stromatoporoids, corals, cephalopods, conodonts, crinoids.
Stop 4: Kozhym River, Marshrutnyj Brook. Sections of upper Telychian-Ludlow open shallow shelf and back-reef lagoonal carbonates with abundant corals, stromatoporoids, brachiopods, ostracodes, cephalopods, crinoids, bryozoans, conodonts.
Stop 5: Kozhym River, Durnayu River. Section of Rhuddanian-Gorstian shallow-water shelf, tidal flat and back-reef (lagoonal) carbonates with abundant corals, ostracodes, bivalves, crinoids, stromatoporoids, brachiopods, conodonts.
Stop 6: Kozhym River, Syv'yu River. Sections of Ludlow-Lochkovian open shallow-water shelf and back-reef (lagoonal) deposits with abundant corals, brachiopods, bryozoans, ostracodes, crinoids, stromatoporoids, vertebrates (thelodonts, *Poracanthodes* and other acanthodians, etc), spores.
Stop 7: Kozhym River, Syv'yu River. Sections of Pragian-Emsian back-reef lagoonal/marsh-alluvial plane deposits with vertebrates (acanthodians, thelodonts, placoderms, etc.), plant microfossils (acritarchs, spores).
Stop 8: Kozhym River, Nortnechyael' Brook. Section of upper Devonian-Tournaisian condensed basin sediments with conodonts, brachiopods, ammonoids, ostracodes, foraminifers, corals.
Stop 9: Kozhym River, Nortnechyael' Brook. Sections of upper Carboniferous-Lower Permian deep-water and shallow-water (reef) deposits with abundant brachiopods, bryozoans, foraminifers, hydroids (*Palaeoplysina*), trilobites, corals, ammonoids.
Stop 10: Domanik River: sections of Middle Frasnian deposits of basin facies (condensed section of the classic "Domanik Facies") with ostracodes, ammonoid and nautiloid cephalopods, dacryoconarids, arthropods, bivalves, conodonts, vertebrates (placoderms).
Stop 11: Quarry on the Izhma River. Sections of Lower Famennian carbonate deposits with abundant vertebrates (antiarchs, porolepiforms and dipnoan sarcopterygians). In this locality also remains of tetrapods have been found.
Stop 12: Yarega oil mine. Here, in a 600 m deep shaft highly viscous oil is produced (using steam heating) from the Middle Devonian sandstones.
Stop 13: Ukhta. Ordovician-Silurian shallow-water shelf and lagoonal deposits with various fossils can be studied in core sections from the Pechore Syneclise.

BARRY WEBBY SYMPOSIUM
11-15 July, 2000
Orange, NSW, Australia

A Symposium celebrating the contribution Prof. Barry Webby has made to Australian and international palaeontology is a major component of the Palaeontology Down-Under Conference, being held in the inland city of Orange (260 km west of Sydney) from

11-15 July, 2000. Papers and posters dealing with aspects of palaeontology which are part of the broad spectrum of Barry Webby's research interests are welcomed. These could include topics such as Ordovician biodiversity, biogeography, biostratigraphy and correlations (in fact virtually anything to do with the life and times of the Ordovician), trace fossils, stromatoporoids, corals, trilobites, early Palaeozoic algae, and Devonian stratigraphy, to name but a few.

Abstracts (maximum 2 pages length) and full payment are due by April 2, 2000.

- The Barry Webby Symposium is scheduled for Tuesday 11 July and Wednesday 12 July.
- A mid-conference excursion to Fossil Hill at Cliefden Caves, the site of many of Barry Webby's discoveries over the past 35 years, will take place on Thursday 13 July.
- The Sir Frederick McCoy Silurian Symposium will be held on Friday 14 July.
- Meetings of IGCP 410 and 421 are convened for Saturday 15 July.
- A 5-day IGCP 410 excursion, visiting the most instructive Ordovician palaeontological localities in central western New South Wales, will run from Sunday July 16 to Thursday July 20. Numbers of participants on this field trip are limited.

A special number of ***Alcheringa*** (vol. 25, nos 1 and 2, scheduled for March\April 2001), to be edited by Glenn Brock and Ian Percival, will include papers submitted at the Barry Webby Symposium (either as oral presentations or as posters). Completed manuscripts are to be submitted to the editors during the conference.

Full details of the Palaeontology Down-Under Conference (including registration form, costs, excursion itineraries, and manuscript formatting requirements) are available in the Second Circular, which can be accessed on the Internet at www.es.mq.edu.au/MUCEP/.

IAN PERCIVAL

GSA PENROSE CONFERENCE
16-21 September, 2000
Edinburgh, Scotland

"The Iapetus Ocean—Its Birth, Life, and Death: The Wilson Cycle"
Applications: contact Ian Dalziel.

Co-conveners:

Ian Dalziel, Institute for Geophysics, University of Texas, 4412 Spicewood Springs Rd., Bldg. 600, Austin, TX 78759-8500, (512) 471-0431, ian@utig.ig.utexas.edu

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Anthony L. Harris, Department of Earth Sciences,University of Liverpool, P.O. Box 147, Liverpool L69 3BX, UK, sr45@Liverpool.ac.uk

Ricardo A. Astini, Universidad Nacionál de Cordoba, Facultad Ciencias Exactas Fisicas y Naturales, Av. Vélez Sársfield 299, C.C. 395, Córdoba 5000, Argentina, rastini@satlink.com

Cosponsor: The Geological Society, London, **Additional supporters:** International Geological Correlation Project #440 and the Tectonics Special Research Centre, University of Western Australia

See www.geosociety.org, or December 1999 issue of *Geoscientist* for details.

Recent hypotheses regarding the possible existence of the Neoproterozoic supercontinents Rodinia and Pannotia have cast the classic concept of a "proto-Atlantic" or Iapetus Ocean in a new and important light. Global paleogeography and paleoenvironment at the time of the Cambrian "explosion" of metozoan life and the rapid radiation of modern phyla center on understanding this ocean that all earth scientists, and particularly we Ordovician workers believe existed between Laurentia and Gondwanaland, the major continental entities of the time interval. Yet much controversy surrounds its history, geography, and environment.

The topic of the meeting therefore embraces specifically the early Paleozoic Ocean off the Caledonian and Appalachian margin of Laurentia and their conjugate margins in Baltica and the newly amalgamated Gondwanaland. The conference will focus mainly on the problem issues of identifying the conjugate margins at the time of the rift-drift transition; the timing of that transition; the paleooceanography and environment of the ocean; and the closure of the ocean basin. In other words, it will focus on modern ideas concerning the classic "Wilson cycle" of ocean opening and closure to form a mountain range.

The meeting, September 16–21, 2000, will be at Our Dynamic Earth, a new exhibition and conference center in Edinburgh, Scotland. Accommodation has been arranged in the Pollock Halls of the University of Edinburgh, a 15-minute walk through Queen Park from Our Dynamic Earth—skirting the Carboniferous Arthurs Seat volcano and Salisbury Craigs sill. Our Dynamic Earth is located near the Palace of Holyrood House in the Old Town of Edinburgh and is adjacent to the

building being constructed to house the new Scottish Parliament. The principal reason for selecting Scotland as the site for the meeting is the significance of the "Scottish Promontory" of Laurentia—between the Greenland and Newfoundland-Labrador parts of the Iapetus margin—for understanding of the questions to be addressed. There is also considerable historical significance in the venue beneath Salisbury Craigs where James Hutton made observations of fundamental importance in the history of geologic thought.

Optional field trips will be arranged to study localities in the Scottish Highlands and Southern Uplands critical to the main issues to be addressed at the conference. These will include visits requested by individuals or groups of participants to localities of particular interest.

Anticipated number of participants: 75. Persons interested in participating should contact Ian Dalziel, preferably by e-mail (ian@utig.ig.utexas.edu) before March 30, 2000.

A brief paragraph concerning interests in the topic of the conference should be provided. Notification regarding acceptance of applications will be sent out before mid-April 2000. Limited funding will be available for graduate students.

RICARDO A. ASTINI

GEOLOGICAL SOCIETY OF AMERICA ANNUAL MEETING
9-18 November, 2000
Reno, Nevada

Ordovician Subcommission activities

The Annual Meeting of the Geological Society of America provides an opportune time and place for the Subcommission to consider seriously the GSSP for the base of the Middle Ordovician Series. The base of the Middle Ordovician Series is a critical boundary for completing subdivision of the Ordovician System. The Subcommission voted in favor of this boundary being defined on the first appearance of the conodont *Tripodus laevis*, which should now be called *T. combsi* according to the conodont specialists. And, many have considered the Whiterock Narrows section in the Monitor Range as an excellent candidate stratotype section. It already is the type section for the North American Whiterock Series. Others, however, find fault with the biohorizon and Whiterock Narrows section. To make progress on this boundary, it is critical that the Subcommission hold extensive discussion to carefully evaluate the selected biohorizon and candidate stratotype sections. Accordingly, the following Subcommission sponsored events have been organized at the GSA Annual Meeting. All interested Ordovician scientists are encouraged to participate.

Topical session

"Global Stratotype Section and Point (GSSP) for Middle Ordovician Series: Biostratigraphy and Candidate Sections." The date of this session is not yet scheduled; it is likely to be on November 15.

Submission is encouraged of papers that deal with 1) the biostratigraphies of fossils groups that span the boundary interval - conodonts, trilobites, brachiopods, graptolites, other shelly fossils, 2) correlation of the boundary interval regionally and worldwide, 3) potential candidate stratotype sections worldwide, 4) sedimentological and eustatic events recorded in the boundary interval, and 5) biotic diversification that marks the boundary interval. Abstracts may be submitted electronically or on paper; deadlines are August 1, 2000 and July 25, 2000, respectively.

Field trip

"Global Ordovician Series Boundaries and Global Event Biohorizons, Monitor Range and Roberts Mountains, Nevada", Thursday–Saturday, November 16–18.

This 2-day, post-meeting field trip will allow participants to critically examine the Whiterock Narrows section. The Red Canyon section in the nearby Roberts Mountains will also be visited because it provides the opportunity to correlate the series boundary into the deep-water graptolite facies. Many Ordovician scientists visited these sections in 1995 during the pre-meeting field trip associated with the *7th International Symposium on the Ordovician System* held in Las Vegas. The coming field trip will provide for much more focused and lengthy examination, as well as on-the-outcrop discussion of the defining biohorizon and the quality of the section as a global stratotype. The Whiterock Narrows and Red Canyon sections are close to the Copenhagen Canyon and Vinini Creek sections that are outstanding records of the Late Ordovician extinction event and associated eustatic sea-level change, described by Finney et al. (1999) in *Geology*. The field excursion will provide the opportunity to examine these sections as well, which should be of interest to most Ordovician specialists.

Subcommission business meeting

The topical session and field trip are Subcommission sponsored events and represent official Subcommission business. All titular members are encouraged to attend. All corresponding members are most welcome and encouraged to participate as well. Many have important contributions to make. A 1-2 hour Subcommission business meeting will be scheduled in

Reno and there probably will be an evening business meeting during the field excursion. It is critical that the Subcommission address the issues concerning the base of the Middle Ordovician Series and move aggressively to resolve them.
Information on the topical session and field trip is published in the April 2000 issue of *GSA Today* (volume 10, no. 4) and is posted on the Geological Society of America web site at http://www.geosociety.org/meetings/2000/index.htm. There one also can find information on other aspects of the meeting including registration.

STAN FINNEY

THE GONDWANAN PLATFORM DURING ORDOVICIAN TIMES: CLIMATIC, EUSTATIC AND GEODYNAMIC EVOLUTION
30 January – 7 February, 2001
Morocco

First Circular

Themes
All themes related to Ordovician evolution in Gondwana platform: Paleontology, Paleo-biogeography & Paleogeography, Stratigraphy, Palaeoecology, Ichnology, Facies and Sedimentary environments, Dynamic Stratigraphy, Eustatism, Climate, Tectonic, Metamorphism Subsidence, Volcanism, Petrography , Mineralogy, Geochemistry, Diagenesis, Geophysics (Paleomagnetism, sismique...) Metallogeny, Mineral and Energetic Resources.

Language
Oral presentation will be in English.

Publication
The proceeding of the meeting will be printed in Morocco or by an international printer. Details for the publication will be given in the second circular.

Scientific program
Monday January 29 th. 2001: Reception and registration of participants.
Tuesday January 30 th. 2001: registration of participants, opening ceremony and scientific sessions.
Wednesday January 31th. 2001: Scientific sessions

Field trip (max participants: 30)
Field trip will be held from 1 to 7 February 2001. It will provide opportunity to examine Lower Ordovician of coastal Meseta, Central High-Atlas, Central and Eastern Anti-Atlas. It will be focused on stratigraphy, sedimentary facies and environments, palaeogeographic reconstructions, dynamic stratigraphy; climatic, eustatic and tectonic controls of sedimentation. It will illustrate: temperate fauna, oolitic ironstones and glauconitites, glacial surfaces, tide and/or storm dominated siliciclastic shelf and various glacio - marine environments: ice distal shelf, tide and storm dominated shelf, tidal sand ridges, ebb tidal delta, carbonate shelf, mixed siliciclastic/carbonate peritidal environments, fan delta and gravity flow deposits.

Thursday February 1/ 2001
- Trip: Rabat – Marrakech
Ordovician of the Coastal Meseta
Friday February 2 / 2001
- Trip: Marrakech - Ouarzazate
Ordovician of Central High Atlas
Saturday February 3/ 2001
- Ordovician of Central Anti-Atlas
Sunday February 4/2001
- Ordovician of Central Anti-Atlas
Monday February 5/ 2001
- Ordovician of Eastern Anti-Atlas
Tuesday February 6/ 2001
- Ordovician of Eastern Anti-Atlas
Wednesday February 7/ 2001
- Trip Erfoud - Rabat

Registration fee
- Scientific sessions: 750 DH (corresponding to 75 US $), students fees : 300 DH corresponding to 30 US $), including volume of abstract, coffee breaks, administrative cost, dinner party.
- Field trip: 7500 DH (corresponding to 745 US $) will cover guidebook and all travel, accommodation, meals and social activity during the field trip.

Climate

The weather is normally nice, days are generally sunny, temperature ranging from 18° to 22°, however early morning and evening may be fresh. Rain is possible.

Invitation and VISA

For visas apply to Moroccan embassy or consular office in your own country .An official letter of invitation for visa can be delivered by the organising committee

Forcoming informations
Information concerning travel to and from Rabat and Casablanca, accommodation in Rabat, social program (for participants and accompanying members), field trip

equipements, detailed field trip program and final registration will be sent in a second circular

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International Meeting
The Gondwanan platform during Ordovician times: Climatic eustatic and geodynamic evolution

Preliminary Registration Form

SURNAME.....
FIRST..NAME(S).....
ADDRESS.....….
PHONE (with code).....…...
FAX (with code)……..
E.MAIL……

Scientific communications
Oral Poster
Topic for which it is registered .....
Title of contribution and authors (in case of co-authorship, indicate the order): ……
……..
……..

I plan to submit a paper for publication
Yes No

Field trip
I would like to participate in the field trip
Yes No

Accompanying member (s)
SURNAME.....
FIRST..NAME(S).....

Social program: Yes No
Field trip: Yes No

If you are planning to attend the meeting and wish receive the second circular, Please return this registration form **before 20 April 2000 to**
NAIMA HAMOUMI
E-mail: hamoumi@wanadoo.net.ma
E-mail: ordovicien@mailcity.com
or
CHOUKRI CHAKRONE
E-mail: c.choukri@mailcity.com
E-mail: ordovicien@mailcity.com

THIRD INTERNATIONAL CONFERENCE ON TRILOBITES AND THEIR RELATIVES
2-6 April, 2001
University of Oxford, U.K.

After successful meetings in Oslo, Norway (1973), and St Catherines, Canada (1997), this meeting will be based at the University of Oxford, UK.
There will be four days based in Oxford, with field-trips preceding and following. The three full day formal programme will afford students of fossil arthropods an opportunity to present papers in both theme-directed and open sessions. There will be invited presentations in the thematic sessions, and contributions of research at any stage of progress are invited for all sessions. Posters will be welcome. The two main thematic sessions will be devoted to the topics `Functional morphology, mode of life and ecology' and `Biodiversity and evolutionary patterns'. Papers on any aspect relevant to the conference will be considered for the day of open sessions.
The pre- and post-conference field-trips will visit the classic Palaeozoic areas of Britain including many Ordovician localities. Field guides will be provided to field-trip attendees. The pre-conference excursion (28 March - 2 April, 2001) will start in Glasgow and examine sites in Scotland and northern England, finishing at Oxford in time for the start of the formal sessions. The post-conference (7-11 April, 2001) excursion will cover Wales and the Welsh Borders, again ending in Oxford.

For further details, contact Dr Derek Siveter, Geological Collections, University Museum of Natural History, Parks Road, Oxford OX1 3PW, U.K. Tel : + (01865) 272953, Fax: + (01865) 272970, e-mail: derek.siveter@earth.ox.ac.uk

ALAN OWEN

WOGOGOB MEETING
16-20 May, 2001
Copenhagen

The next meeting of WOGOGOB will take place in the Øresund region of Denmark and Scania, Sweden with lectures in Copenhagen (16th and 17th May) and

fieldtrips based from Lund (18th-20th May). Opportunities will be available to examine, by request, type material in both Copenhagen and Lund. WOGOGOB was developed to help coordinate all aspects of geological research on the Ordovician of Baltoscandia in its widest sense, extending from western Norway to the Russian platform.
The meeting is an informal forum for the presentation of new data and ideas on Ordovician geology together with fieldtrips to relevant sections. Previous meeting have been held in Jämtland (1988), Estonia (1989), Dalarne and Västergötland (1990), Oslo (1993), Bornholm (1994) and St. Petersburg (1997). The Øresund meeting will focus on current research in the greater Baltoscandian region but there also will be a session on Ordovician biodiversity. More details will be released in the next circular. It is planned to publish a book of extended abstracts at the meeting. Expressions of interest should be sent to the meeting's e-mail_address:
WOGOGOB2001@savik.geomus.ku.dk

Organizing committee:
SVEND STOUGE (Geological Survey of Denmark and Greenland, Copenhagen, Denmark), DAVE HARPER (Geological Museum, Copenhagen, Denmark) and KENT LARSSON (Department of Geology, Historical Geology and Palaeontology, University of Lund, Sweden).

EARLY PALAEOZOIC PALAEOGEOGRAPHIES AND BIOGEOGRAPHIES OF WESTERN EUROPE AND NORTH AFRICA
Paléogéographies et Biogéographies de l'Europe de l'Ouest et de l'Afrique du Nord au Paléozoïque inférieur
22-29 September, 2001
Lille

First Circular

After a successful meeting on the topic Palaeozoic Palaeogeography and Palaeobiogeography of Western Europe, held at Lille in 1992, the Laboratory of Palaeontology of Lille invites you to participate and contribute to a conference on early Palaeozoic Palaeogeography which will take place at Lille in September 2001. A pre-conference field trip to visit the Lower Palaeozoic of Belgium and a post-conference field-trip to the southern Montagne Noire (Languedoc, southern France) will be organized. The conference topics are designed to address various subjects related to the Lower Palaeozoic palaeogeography and palaeobiogeography of Western Europe and North Africa, and include:

1-The geodynamic and tectonostratigraphic framework of Western Europe and North Africa during early Palaeozoic times.
2-Relationships between the northwestern Gondwana margin, Baltica and related terranes (Ossa-Morena, Armorica, Perunica, Avalonia, etc.).
3-Palaeomagnetic versus palaeobiogeographical data.
4-Biostratigraphic improvements of the Pro-terozoic-Cambrian transition and the Lower Palaeozoic (Cambrian to Silurian).
5-Lower Palaeozoic geochemical anomalies and palaeoclimatology.
6-Palaeogeographical controls on biodiversity patterns.
7-Volcanoclastic events and geochronological framework.
8-Evolutionary trends in early Palaeozoic ecosystems.
9-Event stratigraphy and radiation/extinction turnovers.
10-Sea-level changes, cyclicity and palaeoenvironments.
The organizers welcome additional topics that participants wish to have included.

Dates and places
Conference: (3 days)
Université des Sciences et Technologies de Lille, Villeneuve d'Ascq: September 24-26, 2001
Pre-conference excursion: (2 days)
Lower Palaeozoic of Belgium (Brabant, Condroz): September 22-23, 2001
Post-conference excursion: (3 days)
Lower Palaeozoic of the southern Montagne Noire: September 27-29, 2001

Organizers
José Javier ALVARO, Villeneuve d'Ascq
Thomas SERVAIS, Villeneuve d'Ascq

Field trips
Pre-conference field trip organization: Alain HERBOSCH, Brussels & Jacques VERNIERS, Ghent
Post-conference field trip organization: Daniel VIZCAINO, Carcassonne

Scientific committee
Alain BLIECK, Villeneuve d'Ascq
Bernd-Dietrich ERDTMANN, Berlin
Oldrich FATKA, Prague
Naima HAMOUMI, Rabat
Alain LE HERISSE, Brest
Florentin PARIS, Rennes
Gian-Luigi PILLOLA, Cagliari
Jean VANNIER, Lyon
Enrique VILLAS, Zaragoza
Mark WILLIAMS, Keyworth-Nottingham

Organizing institutions

Université des Sciences et Technologies de Lille (USTL)
Centre National de la Recherche Scientifique (CNRS): UPRESA 8014
Groupe Français du Paléozoïque
Société Géologique du Nord
Société Géologique de France
Geologica Belgica
IGCP 410 and 421

Conference proceedings
Bulletin de la Société Géologique de France
Field-Trip Guide-books: Annales de la Société Géologique du Nord

Important Dates
May 2000: First circular
October 2000: Second circular - Call for papers
May 2001: Deadline for Abstracts and registration
July 2001: Third circular - Programme and final arrangements

Please send correspondence to:
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NAME:……
ADDRESS:…….
Phone:…….
Fax:…….
E-mail:…….

I am interested in attending the meeting on Lower Palaeozoic Palaeogeography, and I will definitely plan to attend yes/no
probably plan to attend yes/no
possibly plan to attend yes/no
I plan to present (or co-author)
___. Talk(s)
___. Poster(s)
about……

I am interested in attending the
+ Pre-conference excursion to the Lower Palaeozoic of Belgium (September 22-23, 2001) yes/no
+ Post-conference excursion to the Lower Palaeozoic of the Montagne Noire (September 27-29, 2001) yes/no

7TH INTERNATIONAL GRAPTOLITE CONFERENCE – ARGENTINA 2003

During the last Graptolite Conference (Madrid, 1998), Argentina was chosen as host of the *7th International Graptolite Conference*. Initially, the meeting was planned to be held in 2001, but this date has been changed to 2003 in order to coincide with the *9th International Symposium on the Ordovician System*, which will also be held in Argentina. The main Argentine academic institutions and professional bodies gave their endorsements for the organization of these international events.
Pre and post-conference field trips will be scheduled, visiting classical graptolite localities in the Precordillera, the Famatina System and Eastern Cordillera. The meeting will include oral and poster sessions, and a special volume will be published. Highly fossiliferous sections in wonderful landscapes will be visited, as well as typical folk events will show diverse aspects of our culture to ensure a nice Argentine experience. A first circular with specific information will be mailed shortly.

GLADYS ORTEGA, Chair, gcortega@arnet.com.ar
GUILLERMO ACEÑOLAZA, Secretary,
eg17112@autovia.com

PROJECTS

THE GREAT ORDOVICIAN BIODIVERSIFICATION EVENT

IGCP Project Annual Report Project No. 410
Duration and status: Project accepted for five years (1997-2001)

Project leaders:
1. Barry WEBBY
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3. Mary DROSER

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IGCP Project No. 410 Web-sites:
http://www.es.mq.edu.au/MUCEP/igcp410.htm
[for information about the project]
http://homepages.uc.edu/~millerai/welcome.html
[for details about the database]

Project Secretary (for 1999):
Barry WEBBY
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Date of Submission of Report: 13 October 1999

1. Summary of major past achievements of the Project

In the first two years of the project (1997-1998) work was focused in three main areas: (1) establishment of seven regional teams (Europe/N Africa; Baltoscandia; China/Korea; Kazakhstan/Siberia; N America; Australasia; S America), under general direction of the three co-leaders, with initial work coordinating tasxonomic data and differentiation of biofacies; (2) in a work program essentially complementary to the regional work, to determine the global distribution patterns for the independent clade (taxonomic) groups in time and space, and especially with attention to diversity change; and (3), in order to adequately assess the wealth of data from these work programs, to have a user friendly relational database available for inputting the biotal and other data.

First, major progress has been made by the **regional teams** especially those in Europe/N Africa, China/Korea, Australasia and, since Dave Harper moved to Copenhagen and took on the role of team coordinator, in Baltoscandia. Activities in North America have been centred mainly in the Great Basin and Appalachians, and in the Argentinian Precordillera of South America. Cutbacks and lack of funding support have greatly limited progress in Kazakhstan/Siberia, though Mischa Apollonov has compiled a new correlation chart for Kazakhstan.

Secondly, a good initial response was received to the circulation of a first Circular in September 1998 inviting leading specialists to establish their individual **clade teams** for the complementary work program, in order to focus on global biodiversity patterns of individual taxonomic groups through Ordovician time.

Thirdly, given the mass of data to be collected and analysed in the course of these work programs, we gave particular attention to finding Ordovician colleagues who would be able to support the establishment of a global **database**. Fortunately a suitable, relevant Ordovician focused, web-based relational database had already been established by Arne Miller at the University of Cincinnati (U.S.A.), and support for the development of another database to compile Ordovician data has more recently been provided to Alan Owen in the University of Glasgow (U.K.). We have chosen to use Arne Miller's web-based site for input of our data, but expect, as the Glasgow group develop their database, that their site will become linked for easy exchange of all compiled Ordovician data.

Important IGCP 410 **meetings** were held in St Petersburg (Russia) with accompanying field trip, Salt Lake City (USA), Lyon (France) and Wollongong (Australia) during 1997, and again in Lyon (France), as well as to Seoul (Korea) with a Korean field trip, and Nanjing (China) with two Chinese field trips, during 1998. The St Petersburg meeting, held in conjunction with a meeting of the Working Group on Ordovician Geology of Baltoscandia (WOGOGOB), was attended by 49 scientists from 15 countries, and a 63-page volume of abstracts and separate excursion guide were published. A separate, extended abstract volume and a field guide was published in Korea, and again, a separate volume of extended abstracts and a guide book in China. These were exclusively IGCP 410 activities, in Korea attended by 22 scientists from 7 countries, and in China, by 42 scientists from 11 countries.

Networking and linkages were also fostered in the initial years of the project. Publicity of IGCP 410 activities was widely disseminated to Ordovician workers through the Ordovician Subcommission newsletter, Ordovician News, through a Macquarie University based web site, circulars sent to e-mail addresses, and we established, during 1998, the first issue of an IGCP 410 newletter. The program of IGCP 410 activities has been thoroughly cooperative with the work of the IUGS Subcommission on Ordovician Stratigraphy, and we have also maintained close links with related IGCP projects, in particular IGCP 421 (N Gondwana Mid Palaeozoic Biodynamics).

2. Achievements of the project this year (1999)

2.1. General scientific achievements (including societal benefits)

The main achievements in this third year of the project has been in three areas, comprising regional team, database and clade team work. In our major meetings and workshop discussions held in June in association with the 8th International Symposium on the Ordovician Symposium (ISOS) at the Charles University in Prague (Czech Republic), we were able to review all aspects of progress of the IGCP 410 project. Details of the actual ISOS symposium are provided under section 2.2 (see below).

Regional Teams. A varied amount of progress has been made by the different regional teams established to provide the fullest possible documentation of Ordovician biodiversity worldwide. From the discussions presented by group leaders and their colleagues at the workshop on 24 June, it was possible to get an understanding of just how much progress has been made. In general terms the Europe/Africa regional team under the direction of Florentin Paris has achieved the most, with a considerable volume of compiled (and published) biodiversity data from areas of western-central Europe and North Africa - for France (F. Paris), the U.K. (Alan Owen), Spain (Juan Carlos Gutierrez Marco), Germany (Bernie Erdtmann), the Czech Republic (Olda Fatka) and Morocco (Naima Hamoumi) - see Appendix 5.2(a). Other groups have made slower, or more localized, progress in compiling their data, for example, in the Baltoscandian, Chinese, Australasian, North American and South American regions. In Baltoscandia, after Dave Harper agreed to lead the group there has been excellent progress, and in China there has been active programs of work since early 1998 under the direction of Rong Jiayu, Chen Xu and Zhou Zhiyi (for brief reports from Dave Harper5and Rong Jia-yu concerning the Baltoscandian and Chinese work programs, see Appendix 5.2(b-c). In Australasia the work so far has focused only on Eastern Australia, in North America mainly in the Great Basin and to a lesser extent the Appalachians, and in South America, chiefly in the Argentine development of the Cordillera and Precordillera. Team leaders from Kazakhstan and Siberia have not been able to contribute significantly to the project, and were unable to attend the Prague meeting to report on progress.

Databases. The Prague workshop on Ordovician databases provided a good opportunity to review aspects of our needs for both regional and clade team activities. Arne Miller (USA) who has an established web-based relational database, and Alan Owen and colleague Tim McCormick (U.K.) who are currently developing a British-based database structure attended the Prague meeting, and presented relevant contributions in a special database technical session. Arne also provided a hands-on session of his web-based system from a computer link at the Czech Geological Survey for the benefit of likely IGCP 410 users. It can be concluded that we now have a very accessible means of inputting Ordovician biodiversity data for analysis, and we encourage participants to use the web-based database in their continuing work programs.

Clade Teams. Significant progress has also been made in establishing the clade teams that aim to survey and analyse global diversity patterns through Ordovician time. This will over the next two years involve assessment of originations, extinctions, rates or turnover and diversity change, dependent on the knowledge base of the particular group, down to the level of species (for pelagics) and genus (for most benthic components). We are in final stages of preparing a revised Ordovician time time scale using best available zonal ties, radiometrics and relationships to regional stratigraphic schemes, and of resolving what diversity measures should be employed for this clade team survey. It is essential that all groups use the same time scale and similar diversity measures for this global synthesis.

More than 20 leading specialists have now agreed to participate in the project that will lead to a synthesis entitled: "Ordovician Biodynamics: global patterns of biodiversity change". This will be the theme for our final IGCP 410 meeting in late June 2001, at the University of California (Riverside) and will provide material for a book on this topic. It is intended that the book will be published by a leading scientific publisher shortly after the meeting. A preliminary list of chapter titles and clade group coordinators (=authors) is as follows:-

Introduction & Geological Background (e.g. outline of main zonal schemes, stratigraphic subdivisions, radiometrics, sea level curves, climatic changes, isotopic signatures, volcanism, ocean chemistry and circulation patterns, plate tectonism and orogeny (Barry Webby, Florentin Paris and others)
Acritarchs (Thomas Servais and 22 specialists of the acritarch clade team)
Chitinozoans (Florentin Paris and 15 specialists of chitinozoan clade team)
Radiolarians (Paula Noble)
Calcified Algae (Robert Riding)
Poriferans (Keith Rigby)
Stromatoporoids (Barry Webby)
Corals (Bob Elias, Graham Young, Bjorn Neuman, Barry Webby)

Bryozoans (Paul Taylor)
Brachiopods (David Harper, Lars Holmer, Leonid Popov, Michael Bassett, Rong Jia-yu)
Bivalves (John Cope)
Gastropods (David Rohr and others)
Nautiloids (Bob Frey)
Trilobites (Richard Fortey; not the coordinator but will provide the trilobite database)
Ostracods (Roger Schallreuter)
Echinoderms (Jim Sprinkle)
Graptolites (Roger Cooper, Jan Zalasiewicz, Jorg Maletz)
Conodonts (Stig Bergström)
Vertebrates (Alain Blieck and others)
Trace fossils (Mary Droser and others)
Miscellaneous small groups - scolecodonts (?), cyptospores (Phillippe Steemans), eurypterids (?), etc.
Synthesis (Coordinators listed above and others will be actively involved during, and immediately after, the Riverside meeting)

One other important scientific achievement this year has been the contribution of significant papers on Ordovician biodiversity topics at the Prague meeting. First, there was a special IGCP410/CIMP-sponsored Ordovician Palynomorph Session organized by Florentin Paris and colleagues that focussed on the organic walled microfossil clade groups - the acritarchs, chitinozoans and the cryptospores (see also Appendix 6.4). Twenty eight short papers were contributed to the session. The extended manuscripts of these papers are being assembled in a special issue of the Elseview journal "Review of Palaeobotany and Palynology" to be published in 2000.

Secondly , an additional 44 short papers were contributed to oral and poster sessions of the Prague meeting that dealt specifically with Ordovician biodiversity themes, and have been published in the 534-page symposium volume entitled "Quo Vadis Ordovician" (*Acta Universitatis Carolinae Geologica*, v. 43, nos 1/2 in June 1999).

2.2. List of meetings with approximate attendance and number of countries

As indicated above the major IGCP 410 meeting for 1999 was held in Prague, the Czech Republic, from 20-25 June, and with a pre-sessional excursion to examine Ordovician sequences in Poland and Germany (13-19 June) and a post-sessional trip to the Prague Basin (the Barrandean area) to study the classic cooler, high palaeolatitude-type Ordovician successions and biotas (27 June-1 July). The international meeting was sponsored by IGCP 410, with seventeen scientists significantly helped to attend the meeting, mainly from developing countries (see section 2.6 below). Altogether, 147 persons attended the ISOS symposium, of which some 81 were participants of the IGCP 410 meetings and workshop discussions. These latter include representatives from 21 different countries.

2.3. List of most important publications (including maps)

ACEÑOLAZA, G.F. & GUTIÉRREZ-MARCO, J.C. 1998. *Helminthopsis abeli* Ksiazkiewicz, un icnofósil del Ordovícico Superior de la Zona Centroibérica espa€ola. Geogaceta, 24: 7-10.

ACEÑOLAZA, G.F. & GUTIÉRREZ-MARCO, J.C. 1999. Icnofósiles del Ordovícico terminal (Pizarras Chavera, Pizarras de Orea: Hirnantiense) de algunas localidades españolas. Boletín Geológico y Minero, 110 (2): 123-134.

ACEÑOLAZA, G.F., GUTIÉRREZ-MARCO, J.C., RÁBANO, I. & DÍAZ MARTÍNEZ, E. 1999. Las lumaquelas de la Formaci¢n Sella (Ordovícico de la Cordillera Oriental boliviana) y su interés paleobiogeográfico. Actas XIV Congreso Geológico Argentino, Salta, 1: 355-358.

ACHAB, A., ASSELIN E., LIANG B. 1999. «CHITINOS»- A client-server microfossil image- and data-acquisition system). In: Kraft, P. and Fatka, O. (eds.): Quo vadis Ordovician? Acta Universitatis Carolinae - Geologica, 43 (1-2): 279-281.

ALBANESI, G.L., ESTEBAN, S.B. & BARNES, C.R. 1999. Conodontes del intervalo del límite Cámbrico-Ordovícico en la Formación Volcancito, Sistema de Famatina, Argentina. Temas Geológico-Mineros ITGE, 26: 521-526.

ARBIZU, M., MÉNDEZ-BEDIA, I., ARAMBURU, C., RÁBANO, I. & GUTIÉRREZ-MARCO, J.C. 1999. Diversidad taxonómica de Invertebrados en el Ordovícico Medio del noroeste de España. Temas Geológico-Mineros ITGE, 26: 527-532

BRABCOVA, Z. 1999: Ordovician conulariids of the Prague Basin (Cech Republic). In: Kraft, P. and Fatka, O. (eds.): Quo vadis Ordovician? Acta Universitatis Carolinae - Geologica, 43 (1-2): 433-434.

BROCKE, R. and FATKA, O. (1999): Acritarch assemblages at the „Tremadocian" - „Arenigian" boundary. In: Kraft, P., Fatka, O. (eds.). Quo vadis Ordovician? Acta Universitatis Carolinae - Geologica, 43(1-2): 245-247.

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2.4. **List of countries involved in the project** (please *indicate the countries active this year)

Algeria, Argentina*, Australia*, Austria*, Belarus, Belgium*, Bolivia, Brazil, Canada*, China*, Czech Republic*, Denmark*, Estonia*, France*, Germany*, Ireland, Italy*, Kazakhstan, Korea*, Mongolia, Morocco*, New Zealand*, Norway*, Poland*, Puerto Rica*, Russia*, Saudi Arabia, South Africa, Spain*, Sweden*, Vietnam, United Kingdom*, United States*, Uzbekistan.

2.5. **Activities involving other IGCP projects or the IUGS**

1.This globally directed IGCP project, the first to exclusively highlight Ordovician rocks and fossils, continues to be fully collaborative and supportive of the work of the IUGS Subcommission on Ordovician Stratigraphy, particularly as directed towards establishing a more refined time scale. It also continues to maintain strong links with other relevant IGCP projects, especially nos. 421 (N Gondwanan Mid Palaeozoic Biodynamics) and 406 (Circum-Arctic Palaeozoic Vertebrates), because we share common interests in aspects of the latest Ordovician biotas of North Gondwana, and the Ordovician records of vertebrates in Arctic regions of North America, Baltoscandia and Russia, respectively.

2.6. Participation of scientists from developing countries

We have continued to encourage active participation of developing countries in the IGCP project no. 410 activities. This year, again, most of the funding support (about 80%) was allocated specifically to assist scientists from developing countries meet their travel and accommodation costs to participate in the Prague (Czech Republic) IGCP 410 meetings: Estonian (5 - rail fares and accommodation), Russian (3- rail fares and accommodation), Moroccan (2 - air fares), Argentine (5 - air fares), Polish (1 - rail fare and accommodation). Unfortunately because of Czech visa problems, a number of Chinese who were allocated funds were unable to attend the Prague meeting, and the funds remain unexpended.

3. Proposed activities of the project for the year ahead.

3.1. General goals

We anticipate that progress will continue in the main areas of regional team and clade team data collection during the year 2000. It is expected that regional team work surveying the biodiversity data of a few small areas will be completed during the year, for example, in the Prague Basin (Czech Republic), the Argentine Precordillera, Eastern Australia, and in parts of France and the Great Basin of Nevada and Utah. Active progress is expected to be made during the year on the various programs of clade team work, especially in those groups with active workers and/or an excellent knowledge base, such as the chitinozoans, acritarchs graptolites, conodonts, brachiopods and echinoderms.
Significant amounts of Ordovician biodiversity data are expected to be inputted into the IGCP 410 web-based database in Cincinnati (USA) during year 2000, and rapid progress is expected also to be made by Glasgow colleagues (Alan Owen and his associates), now that they have funding support to establish a complementary database for compilation of their British Ordovician biotal data, and can start to evaluate the meaning of emerging patterns of biodiversity change.
Two main IGCP 410 meetings are scheduled during the year, during July 2000 in Orange, New South Wales (Australia), and during August in Rio de Janiero (Brazil), this latter meeting associated with the 31st International Geological Congress. Both these meetings will provide opportunities for Ordovician workers particpate in a range of activities including relevant technical sessions,

IGCP 410 workshop discussions and field trips (see further details outlined in section 3.2, below).

3.2. Specific meetings and field trips (please indicate participation from developing countries)

(a) Orange, New South Wales (Australia)
A major set of interlocking paleobiological and stratigraphical events (three conferences, two IGCP meetings and associated field excursions) have been programmed to be held in Orange, central New South Wales from 11-15 July 2000, following the 15th Australian Geological Convention from 3-7 July 2000 in Sydney. The Orange conferences include the Australasian Palaeontological Convention-2000, the Third International Symposium on the Silurian System and the Second Australasian Conodont Symposium. Separate IGCP meetings are also scheduled - IGCP 410 (The Great Ordovician Diversification Event) and IGCP 421 (North Gondwanan Mid-Palaeozoic biodynamics). The IGCP 410 activities in Orange will include a business meeting and workshop discussions reviewing recent progress.
The Orange conference organisers are warmly welcoming Ordovician workers to attend the meetings and associated field trips. A Mid-Conference excursion has been arranged for the 13 July to examine mainly Ordovician successions near Cadia and in the vicinity of Cliefden Caves (SW of Orange), and a Post-Conference excursion focusing on the entire Ordovician fossiliferous succession (biostratigraphy, palaeoecology and biodiversity aspects) of the "island-arc" complex is planned for the period 16-19 July. This will still allow time for participants to travel to Queensland to join an excursion to Heron Island on the Great Barrier Reef, from 21-25 July.
There will be an allocated Ordovician session within the Convention-2000 program, and it is expected that papers (especially those on Ordovician biodiversity topics) contributed to the session will be published in a special issue of the AAP journal Alcheringa after the meeting. We are encouraging Ordovician scientists from developing countries to fully participate in these activities, especially workers from countries such as China, Korea, Vietnam, Thailand, Mongolia, Kazakhstan, Russia, Estonia and Argentina, with similar East Gondwana-type, tropical-subtropical, and/or "island-arc", Ordovician biotas.

Additional details of the program of events for the Orange meeting will be posted as the 2nd Circular on the website at:
http://www.es.mq.edu.au/MUCEP/index.htm
before the end of October 1999.

(b) Rio de Janiero (Brazil)
A second IGCP 410 meeting will be held in association with the 31st International Geological Congress in Rio de Janiero (Brazil) from 6-17 August 2000. Special session 2-7 of the Paleontology and Historical Geology symposium has been approved for discussion of the theme:

"The Great Ordovician Biodiversification Event - Significance of Biotal Patterns in both Regional and Global Contexts"

Co-convenors: Barry Webby (Australia); Ramiro Suárez Sorucco (Bolivia); and Guillermo Aceñolaza (Argentina).
This session will provide an opportunity for full discussions of our regional team programs and other biodiversity issues. An IGCP 410 business meeting will be scheduled during the Congress, but no specific Ordovician field trips have been arranged. However a wide range of IGC-organized field trips to different parts of South America are available in the program of events for the Congress - for details see the 2nd Circular, or the website:

www.31igc.org

Again we will be encouraging Ordovician scientists from developing countries to actively participate in this meeting, especially those from countries in South America. Abstracts for eight Ordovician biodiversity papers have already been submitted to the IGC organisers - they include contributions from Argentine, Bolivian, Russian and Canadian workers.

(c-d) Symposia (Riverside, California, Novosibirsk, Russia and Ulan Bator Mongolia) with Field Meetings in Altai Sayan Fold Belt and Mongolia, 2001
Two meetings are proposed in the year 2001. The first will be held in the University of California, Riverside USA, in late June, to focus on the Clade Group work referred to above. The second, will be a joint meeting with IGCP project 421, involving field trips to the Altai Sayan successions in Siberia, with a business meeting and symposium in Novosibirsk, Russia, to be followed by a second field trip in Mongolia with a meeting and symposium in Ulan Bator, Mongolia. This activity is currently scheduled for late August to early September 2001. Expect to have a First Circular circulated to all Ordovician workers in March or April 2000.

4. Request for extension, on-extended-term-basis, or intention to propose successor project

No plans exist at this stage for a request of an extension of this project, or of proposals for a successor project.

5. Other relevant information (Appendices 5.1-5.3)

Appendix 5.1.General Report of the Prague IGCP 410 meetings, held in association with the ISOS symposium, June 1999 (contributed by Ian Percival)

The 8th International Symposium on the Ordovician System (ISOS), held in Prague, Czech Republic from June 20-25, 1999, provided an ideal opportunity for scientists participating in IGCP Project 410 to take stock of progress nearing the half-way point of the project, and to plan work to its completion in 2001. The extent of involvement of Ordovician specialists in IGCP 410 may be measured by the attendance of 50-55 people at its Business Meeting and subsequent Workshops, representing approximately one-third of the entire ISOS registration of 147 scientists and comprising the vast majority of those symposium attendees concerned with palaeontology. ISOS sessions and IGCP 410 meetings were held at the historic Charles University in the centre of the old town in Prague. The ISOS conference proceedings, consisting of 145 short papers printed as a 534-page issue of the journal *Acta Universitatis Carolinae, Geologica* (Vol. 43, parts 1-2), was made available at the time of conference registration through the hard work of editors Petr Kaft and Olda Fatka. Of these papers, 44 were specifically acknowledged as being associated with IGCP 410. Contributions from Australian registrants and co-authors included: Webby et al (IGCP 410 - implications for global correlations and resources); Foster, Winchester-Seeto & O'Leary (Canning Basin Darriwilian microfossils); Percival et al (NSW Ordovician lingulate brachiopods); Webby (Ordovician reefs); and Percival & Webby (East Australian Ordovician biodiversity profiles).

All three co-leaders of IGCP 410 (Barry Webby, Australia; Florentin Paris, France; Mary Droser, U.S.A) were present at the meetings and workshops. At the Business Meeting, Barry Webby - Project Secretary for 1997-1998 - circulated copies of the Annual Report for these initial two years of IGCP 410, as well as the first Newsletter of the Project. These reports documented the considerable progress achieved so far, which has involved a series of world-wide scientific meetings either fully or partly sponsored by IGCP 410, as well as selection of regional and clade teams to co-ordinate research into Ordovician biodiversification patterns.

The IGCP 410 workshops at the 8th ISOS were concerned with work programs of these teams. Seven regional teams (Europe-North Africa; Baltoscandia; China-SE Asia; Kazakhstan-Siberia; North America; South America; Australasia) have been established to compile taxonomic range data and to integrate this information with local biofacies profiles and biostratigraphic schemes, preparatory to recognition of global diversification patterns and the reasons behind these. In the Australasian region, progress has so far been confined to the preliminary compilation of databases of the Ordovician shelly faunas of Tasmania and central New South Wales (by Percival and Webby), together with updating and revision of the Australasian Ordovician graptolite database maintained by Roger Cooper and Fons VandenBerg. An 80-page manuscript, co-ordinated by Webby and Percival with contributions by 12 specialists, on all biotic groups represented in the Australasian Ordovician, was prepared for the PAFF Conference (December 1997) at the University of Wollongong.

An important concluding outcome of IGCP 410 is anticipated to be publication of a volume documenting global patterns of changing Ordovician biodiversity. To this end, clade teams have been established worldwide, comprising specialists in particular taxonomic groups who will analyse global data in order to discern trends of radiations and extinctions. While many of these teams are currently operating, the 8th ISOS provided an opportunity for participants from far-flung regions to meet and discuss progress. Other clade teams were established at the IGCP 410 meetings after selection of co-ordinators. Australians, though few in number, are widely represented in the clade teams, particularly amongst those concerned with stromatoporoids, brachiopods, chitinozoans, and graptolites.

Significant decisions taken at the IGCP 410 workshops included adoption of the globally accessible taxonomic database maintained by Arne Miller (University of Cincinnati; website at http://homepages.uc.edu/~millerai/comment4.htm) to store and analyse IGCP 410 data, and standardisation of the Ordovician timescale as advocated by the Subcommission on Ordovician Stratigraphy, to ensure global consistency in recognition and correlation of biodiversification patterns and events.

Other discussion of future plans for IGCP 410 concerned field conferences and scientific meetings in 2000-2001. There was little support for a conference in Morocco, and a field meeting in Kazakhstan seems unlikely due to financial constraints in that area of the world. An IGCP 410 meeting at the 31st IGC in Rio de Janeiro in August 2000 is largely dependant on support from North and South American registrants. However, the Australian contingent at the 8th ISOS managed to generate considerable enthusiasm for the Palaeontology-2000 conference to be held at Orange, NSW next July, and as a result is working on an expanded IGCP 410 program and excursion as part of this event in order to attract researchers from overseas. For further information on this conference, and news of IGCP 410 activities in general, refer to the MUCEP (Macquarie University) website at http://www.es.mq.edu.au/MUCEP/index.htm

My participation at the 8th ISOS and associated IGCP 410 workshops was sponsored in part by the Australian IGCP Committee (grant-in-aid to defray airfare), the NSW Department of Mineral Resources (registration and living expenses during conference), and the IGCP 410 Executive (cost of fieldtrip). To all I extend my gratitude.

IAN PERCIVAL
Geological Survey of New South Wales
IGCP 410 Regional Team Leader for Australasia

Appendix 5.2. Brief Reports from IGCP 410 Regional Teams:

5.2 (a) Europe-Africa (compiled by Florentin Paris)

[Please note that the published bibliography excluding some abstracts, unpublished material and theses has been compiled in section 2.3 of this Annual Report]

Chair: Florentin PARIS (Rennes, France)
Co-ordinators: Bernie D. ERDTMANN (Berlin, Germany), Olda FATKA (Prague, Czech Republic), Juan-Carlos GUTIERREZ-MARCO (Madrid, Spain), Naïma HAMOUMI (Rabat, Morocco), Alfredo LOI (Cagliary, Italy), Alan W. OWEN (Glasgow, UK),.

The main goals of the Europe-Africa (i.e. Northern Gondwana) Regional Team are still:
1) The record, at species level, of all the taxa represented in the Ordovician of Europe and North Africa, and then, the storage of all these data in a general database.
2) Bathymetric and climatic calibration of the environments prevailing in northern Africa and in Central-South Europe during the Ordovician.
3) Construction of biodiversity curves for each fossil group and for each region.

Contribution from Czech Republic (Co-ordinator: O. FATKA, University of Prague).
Contributors: O. FATKA, P. KRAFT, J. KRAFT (Charles University, Praha), M. MERGL (Plzen), P. STORCH (Praha).
Czech members of IGCP n°410, after their huge report on Ordovician formations, faunas and fossiliferous localities of Bohemia (see report of O. FATKA and P. KRAFT for 1998) organised the 8 th ISOS in Prague from June 20 to June 25, 1999.
A symposium volume grouping some 140 short papers / abstracts was edited by P. KRAFT & O. FATKA (1999) and published in Acta Universitatis Carolinae, Geologica.
A post-conference geological excursion in the Barrandian was organised and an excursion guide was edited by KRAFT J. KRAFT P. & FATKA O (1999).

Contribution from France (Co-ordinator: F. Paris).
Contributors: C. BABIN (Univ. Lyon), J.F. BECQ-GIRAUDON (BRGM, Orléans), A. BLIECK (Univ. Lille), A. BOURAHROUH (Univ. Rennes 1), M.P. DABARD (Univ. Rennes 1), T. DANELIAN (Univ. Paris VI), J. DESTOMBES (Pessac), D. FAUCONNIER (BRGM, Orléans), R. FEIST (Univ. Montpellier I), H. LARDEUX (Univ. Rennes I), B. LEFEBVRE (Univ. Brest), P. LEGRAND (Gradignan), A. LE HERISSÉ (Univ. Brest), J. LE MENN (Univ. Brest), D. MASSA (Suresnes), M. MELOU (Univ. Brest), F. PARIS (Univ. Rennes 1), M. ROBARDET (Univ. Rennes 1), T. SERVAIS (Univ. Lille), J. SHERGOLD (Univ. Montpellier), J. VANNIER (Univ Lyon), M. VIDAL (Univ. Brest).
Most of the French geologists who are interested in Ordovician faunas and sediments are now members of IGCP n° 410. Different sub-projects were initiated:
The most significant among the Ordovician fossiliferous sequences in the Armorican Massif have been investigated and calibrated with regard to their bathymetry by M.P. DABARD, F. GUILLOCHEAU, J.F GHIENNE, A. LOI. Latitudinal location is based on paleogeographic reconstructions of F. PARIS and M. ROBARDET.
The general record of the Ordovician faunas of France is in progress, but not yet finished. New samplings are made by foreign colleagues (e.g. conodonts by E. SERPAGLI team) in order to up date some data.
An extended abstract on the Ordovician of France was presented in Prague under the authorship of the most active members (see Paris et al. 1999). A larger publication including all the paleontological and sedimentological data is now in preparation.

Contribution from Germany (Co-ordinator: Prof. B.D. ERDTMANN).
Contributors: R. BROCKE (Senckenberg-Museum, Frankfurt), S. EGENHOFF* (T. U. Berlin), Prof. Dr. Bernd-D. ERDTMANN (T.U. Berlin), W. HAMMANN (Wursburg), T. HEUSE (Thuringia Geol. Surv.), O. LEHNERT* (Univ. of Erlangen-Nuremberg), U. LINNEMANN (Dresden), J. MALETZ (Univ. of Greifswald), S. POHLER (Univ. of Köln), R. SCHALLREUTER (Univ. Hamburg), Prof. Dr. O. WALLISER (Univ. of Göttingen). B. WEBER (T. U. Berlin), Ulf LINNEMANN (Mus. Mineralogy & Geology, Dresden) and Thomas HEUSE (Thuringia Geol. Survey) were the leaders of the Prague pre-symposium excursion in Thuringia and Saxo-Lusatia (13TH-20 JUNE 1999). They edited a field trip guide

book (see LINNEMANN, U. & HEUSE T. in DZIK, J. et al. , 1999).

Contribution from Iberian Peninsula (Co-ordinator: J.C. GUTIÉRREZ-MARCO).
Contributors: M.A.FOMBELLA BLANCO (Universidad León), P. DOMINGEZ ALONSO, M. ESCRIBANO RODENAS, D. GIL-CID , J.C.GUTIERREZ MARCO, I. RÁBANO, G. N. SARMIENTO, S. SILVAN POBES (Universidad Madrid), E. MAYORAL (Universidad Huelva), C. ARAMBURU, M. ARBIZU SENOSIAN, MÉNDEZ BEDIA (Universidad Oviedo), J. ROQUÉ BERNAL (Universidat Tarragona), R. GOZALO GUTIÉRREZ (Universidad Valencia), E. LIÑÁN GUIJARRO, H. VILLAS (Universidad de Zaragoza), A. PEREJÓN RINCÓN, P. HERRANZ ARAÚJO, S. GARCÍA LÓPEZ, DÍAZ MARTÍNEZ, M. A. SAN JOSÉ LANCHA.

The Spanish group focused its activity on 3 mains points:
- Improvement of the knowledge on the palaeobiodiversity of the Middle Ordovician of north-western Spain where modern data were virtually missing. About 100 fossiliferous sections in the Cantabrian, Asturo-Leonese and Central Iberian Zones have been investigated. This allowed the discovery of several taxa unknown up to now in the Ibero-armorican Domain. These discoveries document peculiar palaeobiogeographic features of part of this domain.
- palaeontological studies and taxonomic revisions of Middle and Upper Ordovician faunas from Spain (e.g. echinoderms, molluscs, brachiopods, conodonts, ichnofossils)
- investigations on perigondwanan faunal dynamic during the Ordovician, including collaborations with colleagues from Argentina, Bolivia, Portugal, Italy (Sardinia), Germany, Morocco, Yugoslavia and Turkey.
A symposium of the Spanish working group of the IGCP n° 410 will held on October 29th, 1999 in Geominero Museum of Madrid (Spain). This symposium is organised by J.C. GUTIÉRREZ-MARCO, in coordination with the XV Annual Meeting of the Spanish Palaeontological Association. Foreign members of IGCP from the Czech Republic, USA, Portugal and Bulgaria are invited. Papers are already published in *Temas Geológico-Mineros ITGE*, 26 (see list of references, Section 2.3 of this Annual Report)

Contribution from Italy (Co-ordinator: A. LOI , University of Cagliari).
Contributors: F. LEONE, A. LOI., G.L. PILLOLA, P. PITTAU (University of Cagliari), . FERRETTI, E. SERPAGLI (University of Modena), R. ALBANI, M. TONGIORGI (University of Pisa).

The activity of the Italian group deals with:
- Studies on Late Ordovician conodont faunas from Europe with conodont collections from Sardinia, Carnic Alps (in collaboration with G. BAGNOLI) and Wales (with C.R. BARNES). The analysis of the Late Ordovician of NW France has just started. Furthermore, Moroccan sections are currently under study.
- Study of the very high and high frequencies in the sequence stratigraphy of North-Gondwana successions (Brittany and Sardinia) containing siliceous-aluminous nodules.
- Facies analysis, eustatic control and geochemistry of the glacial deposits in the Upper Ordovician sequences of Sardinia.
- Sedimentological, palaeoecological and biostratigraphical studies of the Lower Ordovician sequences in the Sarrabus area (Sardinia - Italy): palaeobiogeographical relationships with North-Gondwana domain. Biostratigraphy and palaeobiogeographical relationship of the trilobite fauna from the Ordovician sequences of South Sardinia

Contribution from Morocco (co-ordinator: N. HAMOUMI, University of Rabat).
Contributors: Prof. N. HAMOUMI, and her doctoral students: BEN BOUIDA M., EL MAAZOUZ B., LOAOVAR R., EL KABOVO L., C. CHACRONE (Rabat University); J. DESTOMBES (Pessac, France)

The activities have mainly focused on sedimentological aspects of the Ordovician sequences of Morocco.
One of the main activity in 1999 was the preparation of the pre-symposium field-trip planned in Morocco for the 8th ISOS. Unfortunately, the excursion had to be cancelled due to a too small number of participants.

Contribution from U.K. (co-ordinator: A. OWEN, University of Glasgow).
Contributors: Prof. A. OWEN, T. McCORMICK (University of Glasgow), S. MOLYNEUX (BGS, Nottingham), K. DORNING (University of Sheffield).

Work on IGCP 410 in Britain is centred on the development of a database of Ordovician Faunas of the British Isles by Drs Alan Owen and Tim McCormick at Glasgow University, funded by the Natural Environmental Research Council. The project started in September 1998 and the overall database structure is now established along with a Web-based data input system. The analytical tools are well advanced. In the

first instance, the database is being populated by information on two of the best known groups, the trilobites and echinoderms. Other groups will be added in the coming year, in some instances by specialists who will have the opportunity to analyse their data either in conjunction with Owen & McCormick or independently. Owen & McCormick outlined the Glasgow database and the analysis of the first set of test data at the Ordovician Conference in Prague and presented talks on the project in Glasgow, Edinburgh and Leicester.

References (for additional published papers see Section 2.3 of the Annual Report)

(1). Papers in press:

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GNOLI M. and PILLOLA G.L. 1999 (in press). The oldest nautiloid cephalopod of Sardinia: *Bathmoceras* cf. *linnarssoni* Angelin, 1880 from the Arenigian (Early Ordovician) of Tacconis (South East Sardinia) and remarks on the surrounding biota. *N. Jb. Geol. Paläont. Mh*., 1999, Stuttgart.

GUTIÉRREZ-MARCO, J.C., ARAMBURU, C., ARBIZU, M., BERNÁRDEZ, E., HACAR RODRÍGUEZ, M.P., MÉNDEZ-BEDIA, I., MONTESINOS L¢PEZ, R., RÁBANO, I., TRUYOLS, J. & VILLAS, E. (in press)- Revisión bioestratigráfica de las pizarras del Ordovícico Medio en el noroeste de España (Zonas Cantábrica, Asturoccidental-leonesa y Centroibérica septentrional). *Acta Geologica Hispanica*.

MELOU, M., OULEBSIR L. & PARIS, F. 1999. Brachiopodes et chitinozoaires ordoviciens dans le NE du Sahara algérien: implications stratigraphiques et paléogéographiques. *Geobios*

PARIS F., VERNIERS J & AL-HAJRI S. (in press) Ordovician chitinozoans from Central Saudi Arabia. *GeoArabia*

SARMIENTO, G.N., GUTIÉRREZ-MARCO, J.C. & ROBARDET, M. (in press) Conodontos ordovícicos del Noroeste de España. Aplicación al modelo de sedimentación de la región limítrofe entre las Zonas Asturoccidental-leonesa y Centroibérica durante el Ordovícico Superior. *Revista de la Sociedad Geológica de Espa*ña,.

STORCH P. & LEONE F.. Occurrence of the latest Ordovician graptolite *Persculptograptus ojsuensis* (Koren & Mikahaylova 1973) in Southwestern Sardinia. *Boll. Soc. Paleont. Ital*.. (in press).

(2). Abstracts:

AL-HAJRI S.A., AL-RUWAILI M. PARIS F. & RAHMANI R.A. 1999. Biogeography and Sedimentology of the Hirnantian (latest Ashgill) glacial deposits from the subsurface of North-western Saudi Arabia. *VIII ISOS, Prague*, Abstracts.

BABIN C. 1999. Some aspects of the diversification of the Bivalvia from the Ordovician to the Devonian.*American Malacological Society 65th Annual Meeting, Abstracts*: 20-21.

GAYET M. & BABIN C. 1998. Límites en el estudio de las paleodiversificaciones: ejemplos y problemas. *XIV Jornadas de Paleontología, Tenerife, octubr*e 1998, resumen.

GIL, D. & DOMÍNGUEZ, P. 1999. Ordovician evolutionary fauna of echinoderms and carpoids from Southern Spain. In Candia Carnevali, M.D. & Bonasoro, F. (Eds.): Echinoderm Research 1998. Balkema, Rotterdam: 276 (abstract).

HAMMANN, W., HARPER, D.A.T. & VILLAS, E. 1999. Los braquiópodos de la fauna de *Foliomena* y sus trilobites asociados en el Ordovícico tardío de Cerdeña. *Temas Geológico-Mineros ITGE*, 26: 556 (abstract only)

MONTENARI, M. , SERVAIS, T., & PARIS, F**.** 1999. Palynomorphs from metasedimentary units of the Schwarzwald (SW-Germany). *Abstracts APP meeting,* Tübingen.

PARIS F., AL-HAJRI S & VERNIERS J . 1999 Biostratigraphy and palaeogeography of Ordovician and Silurian chitinozoans from Central Saudi Arabia. *VIII ISOS, Prague*, Abstracts.

PIÇARRA, J.M., ROMÂO, J.C., GUTIÉRREZ-MARCO, J.C. & OLIVEIRA, J.T. 1999. Preliminary note on the Ordovician-Silurian stratigraphic sequence of the Serra de Sâo Mamede region, southern border of the Central Iberian Zone, Portugal. J*ournal of Conference Abstracts, Cambridge*, 4 (3): 1018.

TORRES, M., GIL CID, D. & DOMÍNGUEZ, P. 1998. Stable multimodal fivefold patterns in crinoids: a general mathematical approach. *Symposium Morphometries et Biologie Evolutive*, Paris 26-27 octobre 1998, p. 27 (abstract).

(3). Published thesis:

LEGRAND, P. 1999. Approche stratigraphique de l'Ordovicien et du Silurien inférieur du Sahara algérien par l'étude des Diplograptides (Graptolites). *Thèse de doctorat d'Etat,* (1998), Université Michel de Montaigne-Bordeaux III, Institut EGID, 3 vol., 891 p., 3 annexes.

5.2 (b) Baltoscandia (submitted by Dave Harper)

[Brief report of] first meeting [held] in the unlikely setting of Prague street bar. Unfortunately time is not on our side but a huge amount of work has been done

already by groups and individuals in Baltoscandia. A number of points emerged from our meeting.

General Points

1. Most people agreed the project could move forward in three ways. Firstly to establish clade teams to handle as many of the groups as possible. But secondly there may be multidisciplinary (cross-clade) groups that wish to look at particular boundary problems. Thirdly there should be input from say the isotope workers and sequence stratigraphers. All three approaches are compatible. But it will be up to individuals to form these groups. Some groups are well established already. Perhaps we can 'advertise' for collaborators or note the existence of these groups on the web page. The groups should be as inclusive as possible and hopefully many younger workers will be involved.
2. We will set up a web page for the project here in the Geological Museum. I would ask people to send me their research interests and lists of relevant publications (I have a number already) by e - mail. The page could act as a 'clearing house' through which individuals and groups can make contact with each other. News of any groups that are already up and running would be useful.
3. Move towards having a meeting under the umbrella of 'WOGOGOB' in May 2001. Copenhagen was put up as a possibility with field trips to Scania and Oland. We are quite happy to organize the meeting here in the Geological Museum and raise the necessary funding to support the meeting. Also we should aim to publish these papers prior to the meeting in Riverside later in the year.

Specific Points

1. We should try and record data with as much precision as possible. For example taxonomic data should be recorded where possible at the species level and stratigraphical data at zonal levels together with locality information. This of course will not always be possible; mixtures of data will be inevitable. Notes on facies and palaeogeography will also be useful.
2. It is really up to individuals and groups how they handle their data and set up their own databases. But clearly at some stage it should pass into common ownership in the IGCP database. Groups may find it useful to contact A. Owen (a.owen@earthsci.gla.ac.uk) and Tim McCormick (t.mccormick@earthsci.gla.ac.uk) at Glasgow or Arnie Miller (arnold.miller@uc.edu) at Cincinnati for advice on database structure and analysis.

As informations comes in we can identify gaps in the project. Meanwhile have a good Summer and I look forward to receiving your news.

DAVE HARPER; dated 14 July 1999

5.2 (c) China (submitted by Rong Jia-yu and Chen Xu)

. . [We] report [here] the information about the activities and plans of the Chinese project activity for IGCP 410 since our Nanjing meeting last year, and our plans over the next year or so, at one of IGCP 410 meetings in Prague . . [as] we will not be able to attend the meeting. So we now would like to report you the information as follows briefly.

1. The basic data are most important. We have started to check all taxa of the Ordovician graptolites, brachiopods, trilobites, niutiloids, and conodonts in South China. First, we will check whether the original identification is correct; second, we will make several stratigraphical range charts for every major fossil groups; third, we will have a diversity fluctuation from each groups during different epochs or stages through Ordovician; fourth, we will analyse and explanate the causes of those fluctuations.
2. We have got a financial support from the National Natural Science Foundation of China on the Ordovician Biodiversity of China (1999-2001) organized by Chen Xu. This project will support the research of the Chinese working group. The purpose of the Chinese project is 1) investigating the diversity changes of the major fossil groups from the Yangtze (platform), Jiangnan (slope) and Zhujiang (basin) regions through the Ordovician; 2) comparing the diversity changes geographically from the Yangtze platform through the Jiangnan slope belt to the Zhujiang basin.
3. The project will support three field excursions this year and in 2000: 1) supporting trilobite and nautiloid workers working on the Upper Yangtze platform; 2) supporting graptolite, brachiopod and reef workers working along the south edge of the Yangtze platform; 3) will support the graptolite workers working in the Zhujiang basin next year.
4. The Chinese workers will start to submit papers on Ordovician biodiversity from next year to different journals around the world.
5. We expect that the IGCP 410 project will organize some proceedings, volumes or even books for gathering results from different countries or organize papers to concerned journals.

RONG JIA-YU AND CHEN XU; dated 13 June 1999

5.2. (d) South America (submitted by Gilberto and Guillermo Aceñolaza)

Work has been focused on the three main areas with Ordovician outcrops in Argentina: the Precordillera, the

Oriental Ranges and the Puna geological provinces; as well as the Oriental Ranges of Southern Bolivia and the southern part of Perú, where new graptolite data have been obtained.
Different working groups from the universities of Salta, Tucumán, Catamarca, La Rioja, Córdoba and La Plata, as well from the National Research Council from Argentina (CONICET) are actively doing field work on Ordovician units and studying the material collected. New sections were chosen and a large amount of biostratigraphical information produced in the last year, being published in the international media. New data on conodonts, graptolites, trilobites, brachiopods and bivalves were obtained and more material is under study. Taking into account the significant lack of data on South America in international publications, the focus has been on increasing the biostratigraphical knowledge of the latter areas, as well as publishing.
Regional interpretation of the faunas and the definition of biozones suitable for correlation within the South American continent, and their relationships with the standard units within the Gondwanan margin and close terrains, are also a major aspect of research that is being developed. Stratigraphical, sedimentological, and volcaniclastic processes related to the Ordovician seas were assessed to get a clearer idea of the depositional processes and environmental characteristics of the areas where the faunas developed.
The Argentinian working group (Tucumán, Córdoba and Salta) is involved in international relations with other IGCP regional groups as the one from Spain, Bolivia and Perú. (J.C. Gutiérrez-Marco & E. Díaz from Madrid, and E. Villas from Zaragoza). Some joint papers are being published in Spain and Argentina, as well as two meetings within the groups are being scheduled for later this year (Annual Paleontological meeting in Madrid, October 1999, and the Argentinian National Geological Congress, in Salta, September 1999).

F.G. ACEÑOLAZA AND G.F. ACEÑOLAZA; dated 5 July 1999
INSUGEO - CONICET
Universidad Nacional de Tucumán
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ARGENTINA

Appendix 5.3. Brief Report and Publications - Ordovician Palynomorph Sessions during the 8th ISOS, Prague June 22, 1999 (compiled by F. Paris)

Under the auspices of CIMP (Commission internationale de Microflore du Paléozoïque) and of IGCP n° 410 "The Great Ordovician Biodiversification Event " a special session was held during 8th ISOS in Prague (Czech Republic) on June 22, 1999. Four additional papers corresponding to the CIMP-SAUDI ARAMCO project were included in the program because they had direct implications with IGCP n° 410, especially with the Europe-Africa (Northern Gondwana) Regional Team, as well as with the Acritarchs, the Chitinozoa, and the Cryptospores Clade Teams.
A total of 28 extended abstracts have been submitted for these special sessions dealing mainly with acritarchs (12 papers), chitinozoans (10 papers) and to a lesser extent with cryptospores/spores (2 papers), scolecodonts (1 paper) and miscellaneous (3). These abstracts were proposed by 44 authors and co-authors from 17 different countries. Finally, some contributors were absent and only 22 full versions of these abstracts have been proposed for publication in Review of Palaeobotany and Palynology.
T. SERVAIS and F. PARIS are the editors of this special issue of Rev. Palaeobot. Palynol. published by Elsevier. All the revised manuscripts are expected before the end of the year, for publication in 2000. These papers will have the double label IGCP n° 410 and CIMP.

SCIENTIFIC REPORTS

DISCUSSION ON THE PROPOSED CAMBRIAN-ORDOVICIAN BOUNDARY STRATOTYPE

James F. Miller

The recent recommendation of the Green Point section in Newfoundland to be the stratotype for the base of the Ordovician System is an excellent example of the triumph of bad politics over good science. Stratigraphic sections may be considered to fall into three categories: 1) useful, 2) useless, 3) worse than useless and actually confusing. The Green Point falls into the third category. The problems are related to its depositional setting at the base of the continental slope and are true of all sections in the Cow Head Group. First, there is no *in situ* Cambrian fauna at Green Point, so Cambrian specialists will have no idea how to correlate the top of the Cambrian System to other sections. There are only two trilobite horizons, both in debris slides, and the boundary is placed between them. The lower trilobite horizon has yielded faunas of several different zones from different clasts. Second, the conodonts in the Green Point section are of mixed ages and clearly redeposited, so there is no conodont homotaxial succession. Entire conodont faunas characteristic of several pre-Tremadocian biozonal units that are known from North America and other continents are redeposited at or within decimeters of the proposed boundary. The boundary itself is placed at the horizon in the section where conodonts become common; strata

below the boundary have almost no fauna. Strata at the proposed boundary correlate equally well to about 94 meters of strata in the Ibex area of Utah. This ridiculous correlation results from the fact that redeposited conodonts at the proposed boundary interval at Green Point are spread out through a thick interval of strata in other parts of the world, including Utah.

It is clear that the Green Point section fulfills only the political need to define a stratotype somewhere--anywhere. However, this section will not fulfill the scientific need to provide a section that the stratigraphers of the world can use as a basis for correlation. True, the section has an excellent succession of the early planktic graptolites, but they begin some meters above the boundary horizon. It is not possible to tie these graptolites into the conodont succession because the conodonts are redeposited and of mixed ages. One must make arbitrary decisions about which conodonts to use for correlation and which to ignore, and such decisions are a matter of opinion and are not self-evident as would be the case if there were a natural conodont homotaxial succession. Thus the world will be in the same situation that it has been in for more than a century: it will be possible to correlate the base of the Ordovician approximately by the use of graptolites only. This is the problem that led to 25 years of research on this boundary, and now we are back where we began.

Clearly there must be a practical alternative to the proposed GSSP at Green Point. Currently the best known and most complete sections through this interval are in the Ibex area of Utah (see U.S. Geological Survey Professional Paper 1579 by Rube Ross and others). In addition to the data provided therein, many of us are working on the Lawson Cove section in the Ibex area to provide a single measured section (244 m thick) in which one can recognize the bases of the Ibexian Series, Canadian Series, and Tremadocian Series. This section has the best documented conodont succession in the world through this interval (44,000 identified specimens), an excellent trilobite succession that includes some cosmopolitan taxa, the best carbon-isotope profile known through this interval, an excellent sequence-stratigraphic record, and a good record of phosphatic brachiopods. In the nearby Lava Dam North section I recovered the lower Tremadocian graptolite *Anisograptus matanensis,* and its relationships with the conodont and trilobite zonations are well documented. Lawson Cove and Lava Dam North will become the sections that stratigraphers will use to decipher the stratigraphic and biostratigraphic mélange at Green Point and to use as a practical basis for international correlation through the uppermost Cambrian and lowermost Ordovician.

Anyone interested in further information on problems associated with the Green Point section may visit the following site on the worldwide web: http:// geosciences.smsu.edu/Faculty/Miller/Ordsubcom.htm. Also see the papers by Miller and Flokstra, Miller and others, and by Loch, Stitt, and Miller in the proceedings volume from the summer meeting in Prague.

ORDOVICIAN AND SILURIAN RESEARCH IN NANJING

Publications since 1998

Chen Xu

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Research Projects:

Chen Xu

1. **Ordovician Series and Stage GSSP Study in China.** This project is supported by the Chinese Academy of Sciences (Academia Sinica) since 1998. The members of the project include Rong Jia-yu, C. E. Mitchell, D.A.T. Harper, Fan Jun-xuan, Zhang Yuan-dong, Wang Zhi-hao, Zhan Ren-bin, and Wang Zong-zhe, etc. The main purpose of the project is (1). a systematic study on the GSSP candidate of Hirnantian Substage in China, (2). a systematic paleontological study of the Darriwilian fossil groups from the JCY area, and (3). stratigrapgical and paleontological studies on the Pingliang and Dawangou candidate section of the Base of Upper Ordovician. Related publications have been published in the Acta Universitatis Carolinae 1999, and will be published in various publications in the Y2K. Profs. S.M. Bergstrom and S.C. Finney have cooperated with the project and worked with Chen Xu and Wang Zhi-hao since 1998.
2. **Ordovician Biodiversity of South China.** This project is supported by the National Natural Science Foundation of China since 1999. The project is also related to the IGCP 410 project. The members include Rong Jia-yu, Zhou Zhi-yi, Zhang Yuan-dong, Zhan Ren-bin, Zhang Yong-bai, Yuan Wen-wei, and Fan Jun-xuan, etc. Profs. B. D. Webby, A.J. Boucot, S.M. Bergstrom have been invited as contributors. An Ordovician diversity research through space and time of South China will be the main purpose of the project. We have held a Nanjing indoor meeting and field excursions in Yichang and the JCY areas in 1998. Abstracts have been published in Palaeoworld no.10, 1998. Related papers have been published in the Acta Universitatis Carolinae 1999, and will be published in various publications in the Y2K.
3. **Contribution to Treatise (Graptolite 3ed.) based on the Chinese data.** This new project is supported by the Laboratory of Palaeobiology and Stratigraphy, Nanjing Institute of Geology and Palaleontology from 2000. The members include Zhang Yuan-dong, Fan Jun-xuan and C.E. Mitchell. The graptolite genera published in China will be re-studied. Ordovician and Silurian graptolite zones of China will be defined based on new data.

Rong Jia-yu

1. **Biotic recovery following three Palaeozoic mass extinctions of South China.** This project has been funded by Academia Sinica, National Natural Science Foundation of China, and Special Support of Paleontological Research and led by Rong Jia-yu and

Fang Zong-jie since 1996. It includes three major groups: the Ordovician-Silurian group (Chen Xu, Zhan Ren-bin and others), Frasnian-Fammenian group (Liao Wei-hua and others), and later Permian group (Fang Zong-jie, Chen Jin-hua, Sun Dong-li and others). The major organism groups studied contain brachiopods, bivalves, rugose corals, reefs, graptolites, conodonts, foramenifera, and a few others. Comprehensive basic data of biostratigraphy, taxonomy, synecology, and palaeobiogeography came from South China have been gethered by all colleagues. Different research groups conducted field works in many areas of South China in the last three years. Many papers on various topics will be collected and a book on **Biotic recovery following three mass extinctions of South China** will be edited by the project co-leaders for publication within this year.

2. **Ordovician and Silurian brachiopod synecology and palaeobiogeography of China.** This project was funded by National Natural Science Foundation of China and the Laboratory of Nanjing Institute of Geology and Palaeontology, Academia Sinica during the period of 1995-1998. Zhan Ren-bin, Xu Han-kui, Li Rong-yu, Su Yang-zheng, and Fu Li-pu are involved. Having checked the taxonomy of the Ordovician and Silurian brachiopods of China, 90 plates of the brachiopods are included. Many palaeoecological communities have been recognized and assignment of these communities to Benthic Assemblages has been made. The biogeography of Ordovician and Silurian brachiopods have been discussed. A book of this project will be published by Science Press next year.

Zhou Zhi-yi

I have been working on the Ordovician trilobite biofacies of the Yangtze Block with Zhiqiang Zhou and Wenwei Yuan since 1998. The project aims to analyse the temporal and spatial distributions of both benthic and pelagic trilobites in response to biofacies. So far, different trilobite associations in relation to on-shelf to off-shelf environment gradient have been discriminated along two profiles across respectively the southern and northern marginal areas of the Yangtze Block. According to the facies association of morphologically similar cyclopygid trilobites, a depth-induced ecological differentiation between those mesopelagic forms is revealed.

Zhou Zhi-qiang and I are planning to work on some Ordovician sections in Guizhou in 2000.

Li Jun

1. **Algae as roles for aftermath ecosystem reconstruction: An example from O/S of S. China.** Supported by National Natural Science Foundation of China since 1999. Carried out by Li Jun, Li Yue and Wang Zong-zhe (Nanjing), and R. Brocke (Frankfurt).
2. **Searching Wenlockian rocks in the Yangtze Platform.** Supported by Laboratory of Palaeobiology and Stratigrathy, Nanjing since 1999. Carried out by Li Jun and Yuan Xun-lai.

Yuan Wen-wei

Participating in two NSFC projects, "Ordovician trilobite biofacies of South China" (lead by Zhou Zhi-yi) and "Ordovician Biodiversity of China" (lead by Chen Xu).

Fan Jun-xuan

1. **Late Ordovician-Earliest Silurian quantitative biostratigraphic researches in South China.** This project is funded by the Laboratory of Nanjing Institute of Geology and Palaeontology from 2000.
2. Participating in three research projects: "**Ordovcian Series and Stage GSSP Study in China**" which is supported by the Chinese Academy of Sciences (Academia Sinica) since 1998, "**Ordovician Biodiversity of South China**" which is supported by National Natural Science Foundation of China since 1999, and "**High resolution biostratigraphic researches of Ordovician, South China**" which is supported by the Special Support Project of the Chinese Academy of Sciences since 1998.

West Yunnan Field Excursion in 2001:

West Yunnan was a part of the Sibumasu block during the Ordovician and Silurian periods. The Ordovician and Silurian rocks and fossils are different from those of Yangtze and Tibet in a certain extent. It may be a key region to correlate these regions with Southeast Asia as well as Australia. The Ordovician and Silurian are well developed in one hand but not very well studied in other. We have been told from many colleagues, especially from some old friends that we should organize a field excursion for the Ordovician and Silurian subcommission colleagues in this region before we really get old. It is also our own interesting to investigate this region especially to the reference sections in the Baoshan area since it is also a new area for us. We tried to organize this field excursion in the Y2K. However, the year has too many international activeties. So, we have informed to the colleagues that we will organize this excursion in the ywar of 2001. Hope that we have more than 10 people joining with us. It will be difficult if only a few people participate since we, scientists, must

keep expanses lower. We will distribute further information later.

Well, Yunnan is a tourist province in China with beautiful lakes and mountains, subtropical climate, rich vegetables and fruits, as well as various friendly minority nationalities. We expect that our colleagues, old friends and their accompanies will share a nice time with us. We are looking forward to hearing from you in the near future!

Stratigraphy and fossil record of West Yunnan

The Baoshan area (25.1N, 99.1E) is a classic area for studing the Ordovician and Silurian rocks and fossils in West Yunnan. The Silurian section is at Jenhochiao, 40 km. south of the Baoshan county town and the Ordovician section is at Pupiao, west of the Baoshan county town. In descending order, the Silurian and Ordovician rocks are as follows.

Lower Devonian

Un-named Argillaceous Limestone (50m, Ludlow-Pridoli)

Purple, gray-green marl and limestone with a few black shale interbeds. *Camarocrinus, Michelinoceras,*and *Spathognathodus eosteinhornensis,* etc have been recorded.

Upper Jenhochiao Formation (56.5m, Wenlock)

Yellow and purple weathered silty shale with graptolites *Cyrtograptus* (rare) and other monograptids. Shelly fauna is mainly trilobites (*Calymene* etc.) and conodonts (*Spathognathodus pennatus* etc.)

Lower Jenhochiao Formation (250m, Llandovery)

Yellowish-brown and black sandy shale and shale. Six graptolite zones, including *M. crispus, S. turriculatus, S. sedgwickii, D. convolutus, C. gregarius,* and *C. cyphus* zones have been recorded by Mu (1962) in descending order. Ni *et al.* (1982) have also found *Akidograptus* sp. at the base of the formation. Llandovery shelly fauna incluing *Pseudaristocystis* and *Leonaspis*, etc. have also been recorded.

Wanyaoshu Formation (10m, Hirnantian)

The type section is at Wanyaoshu, 10 km. southeast of the Luxi County town. It is composed mainly of dark gray and gray-black sandy-mudstone, with calcareous concretions. The lower part of the unit yields a *N. ojsuensis* graptolite fauna and the upper part includes a *Dalmanitina - Hirnantia* fauna. This is a typical *Hirnantia* fauna.

Upper Pubiao Formation (632m, late Caradoc to Ashgill)

Purple-red and yellow-green calcareous and argillaceous siltstones and mudstones. Brachiopods *Foliomena*, Trilobites *Nankinolithus, Harmatocnemis* and nautiloids *Pleurorthoceras, Michelinoceras*, etc. have been recorded.

Lower Pupiao Formation (237m, Caradoc)

Yellow-greenish silty mudstone with marls. Graptolites *C. peltifer* and *H. teretiusculus* fauna have been recorded.

Shihtien Formation (463m, Darriwilian)

It consists of yellow-green and yellow-brown sitly mudstone and argillaceous limestone. Graptolites D. (D.) murchisoni, A. confertus and U. austrodentatus zones have been reported. Shelly fauna includes mainly trilobites (Basiliella, Nesuretus etc.), brachiopods and crinoids.

Bingdou Formation (165m, mainly Lower Ordovician)

Variegated shale and siltstone with argillaceous limetones. Dendroid graptolites and trilobites have been reported.

International Cooperation:

Chen Xu

A joint project with Art Boucot and Chris Scotese working on Phanerozoic Climatology since early of nineties. An English manuscript on **Preliminary Compilation of Cambrian through Miocene Climatically Sensitive Deposits** (Boucot, A.J., Chen Xu, and Scotese, C.R.) will be completed this year. A Chinese version on **Palaeozoic Climatological Evolution of China** (Chen Xu, Ruan Yi-ping, Boucot, A.J., Peng Shan-chi, Scotese, C.R., Wang Zong-zhe, and Liu Lu-jun) will be published this year by the Science Press, Beijing.

A joint paper on **Graptolites from the Qilang and Yingan formations (Caradoc, Ordovician) of Kalpin, Western Tarim, Xinjiang, China** (Chen Xu, Ni Yu-nan, Mitchell, C.E., Qiao Xin-dong, and Zhan Shi-gao) will be published by Journal of Paleontology soon.

Chen Xu will publish other papers with Chuck Mitchell and other colleagues in this year. Will report in the coming renewed home page.

Rong Jia-yu

A joint project with David Harper on the Early Silurian brachiopod recovery following the latest Ordovician mass extinction of China. The paper will be published in International Geology at the first number of the new Millenium.

A joint project led by Markes Johnson from Williams College, Williamstown, MA is supported by Geographical Society of America. It studies a Silurian rocky shore in southern part of Inner Mongolia, North China. The work has been carried since last year.

Li Jun

Rainer Brocke (Frankfurt) visited Nanjing in October for one month, as host, Li Jun went to geological excursions with him in Yushan, Jiangxi and Tangshan, Nanjing. They took part in the 7th International Symposium on Fossil Algae (Nanjing) and present two abstracts: (1) Darriwilian acritarchs from the Yangtze Platform of South China. (2) Planktonic algal microfossils from Early Silurian of northern Guizhou, South China. Rainer will visit Nanjing in June, 2000 again for joint project with Li Jun.

Thomas Servais (Lille) is working on some Ordovician acritarchs with Li Jun and R. Brocke and he will visit Nanjing in June, 2000. He will be co-chairman with Li Jun for Lower Palaeozoic Palynology Symposia in the 10th International Palynology Congress (Nanjing).

News and Media:

1. A New English book will come out very soon!

GEOLOGICAL HISTORY OF THE NANJING HILLS - A GUIDE FOR OVERSEAS GEOLOGISTS with 93 text-figures, 4 colour plates, and 12 black-white plates.
Edited by Chen Xu, Wang Hai-feng, and C.H. Holland

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Purpose (Chen Xu and Wang Hai-feng)
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2. SinoCor 1.0 and 2.0, the practical softwares for graphic correlation

1) SinoCor 1.0
The design of SinoCor 1.0 was commenced by Fan Jun-xuan and Zhang Yuan-dong in 1997 and finished in early 1998. It is written in Visual Basic programming language and designed for Windows. The program includes three basic modules: (1)Input module, including input and revision of raw data; (2)Process module, dealing with plot of data, drawing LOC and compounding of sections; (3)Output module, including output of raw data, intermediate data and final results. It was first designed for Windows 3.1, but also fits Windows 95 and 97 due to the downward compatibility of Windows.
SinoCor 1.0 adopts interactive graphical interface and thus it can be easily operated. So far as it is designed, the program can deal with 30 sections and 60 taxa at one time. Besides, SinoCor supports all the printers which can be used under Windows.
SinoCor 1.0 is packed as two 3.5' setup disks and it is suggested that users install and run the program in the following circumstances: (1)PC, 486 or higher; (2)4M RAM, 8M or higher will be better; (3)Windows 3.1 or higher version; (4)at least 3M hard disk space.
2) SinoCor 2.0
The new version of SinoCor is programmed by Fan Jun-xuan from latest 1999. It is expected that it can be finished in the middle of this year and will be adopted in the quantitative biostratigraphic research of South China.

NEW CONODONT DATA FROM THE LATE ORDOVICIAN OF CENTRAL CARNIC ALPS (AUSTRIA) WITH REPORT OF A SIGNIFICANT HIRNANTIAN FAUNA

Annalisa Ferretti and Hans Peter Schönlaub

Carnic Alps are mostly associated by Ordovician conodont workers to the classical paper of Serpagli (1967) who carefully monographed faunas recovered from the "Tonflaserkalk" of Rifugio Nordio and Monte Zermula (Italy). Previously described associations from the Austrian side (i.e. Flajs & Schönlaub, 1976) were mainly composed of scarce and poorly preserved material. Due to the absence of M elements of the Late Ordovician age-diagnostic *Amorphognathus* species,

their age could only be estimated by comparison with Serpagli's material.

Preliminary results derived from the study of the Late Ordovician exposed in Central Carnic Alps, Austria, have provided new important informations. Both the Uggwa and Wolayer limestones were unequivocally dated to the *Amorphognathus ordovicicus* Zone. The conodont faunas closely recall in composition and age the material described on the Italian side. *Hamarodus europaeus* (Serpagli, 1967), *Scabbardella altipes* (Henningsmoen, 1948) and *Walliserodus amplissimus* (Serpagli, 1967) are the most typical taxa. A stronger link with Sardinia compared to other Southern European areas of the Northern Gondwana region and an outer position of lower latitudes are once more suggested.

An important goal of this investigation was the recovery of an abundant and moderately diverse fauna composed of more than twenty species immediately above a well known *Hirnantia* brachiopod level in the Cellon Section, the famous Silurian stratotype for Eastern and Southern Alps. From the same Plöcken Formation Walliser (1964) had reported part of his "Bereich I". *A*. cf. *A. ordovicicus* Branson & Mehl, 1933 and *A. lindstroemi* (Serpagli, 1967) are present, associated with other taxa which were previously common in colder regimes. Furthermore, an important presence of "*Birksfeldia-Dichodella*" is here indicated. This material, which still keeps a clear Ordovician aspect, permits a first significant definition of the Hirnantian conodont fauna from the North Atlantic Province.

All these data are in press in the "Bollettino della Società Paleontologica Italiana" (FERRETTI, A. & SCHÖNLAUB, H.P., Late Ordovician conodonts from Central Carnic Alps, Austria, with report of an Hirnantian fauna).

HONORARY NOTES

AWARDS

STIG BERGSTRÖM *Awarded Two Distinguished Medals*

Stig Bergström's important contributions to Ordovician Stratigraphy were recognized by two prestigious awards bestowed on him in 1999: the Raymond C. Moore Medal of the Society for Sedimentary Geology (SEPM) and the Golden Medal of the Faculty of Science at Charles University, Prague. The Raymond C. Moore Medal for excellence in Paleontology was awarded at the SEPM/AAPG Annual Meeting on April 12, 1999 in San Antonio, Texas. The award was given in recognition of Stig's many important contributions on taxonomy, evolution, biostratigraphy, and biogeography of Ordovician conodonts and graptolites and in recognition of his extensive, valuable contributions to Ordovician Stratigraphy and long-term service to the International Commission on Ordovician Stratigraphy. In the words of distinguished Woodwardian Professor Harry B. Whittington, who wrote in support of Stig's nomination, "Stig Bergström has combined meticulous systematic paleontology of Ordovician conodonts and graptolites with detailed stratigraphic correlations in the true style of Ray Moore."

On June 25, 1999, during the closing ceremony of the 8th International Symposium on the Ordovician System in Prague, Stig was awarded the Golden Medal of the Faculty of Science at Charles University in recognition of his outstanding contributions to Ordovician stratigraphy and establishment of the GSSP for the Darriwilian Stage. Chen Xu, who unfortunately could not attend the Prague meeting, was also awarded the Golden Medal for his contributions towards establishment of the Darriwilian GSSP and for his many contributions on the Ordovician stratigraphy of China.

STAN FINNEY

Albert - Maucher Preis to **OLIVER LEHNERT** (University of Erlangen, Germany)

During the last session of the past millennium the "Geokommission" of the "Deutsche Forschungs-gemeinschaft" (DFG) in Bonn awarded the prestigeous "Albert-Maucher Preis" to Dr. Oliver Lehnert for his outstanding research on Ordovician conodont biogeography and biostratigraphy which strongly contributed to the hotly debated Laurentian derivation of the allochthonous "Precordillera de San Juan" and "Cuyana Terranes" of west-central Argentina. Oliver´s essential detective-type species by species correlation analysis not only assured the scientific world of the endemic facies which assembled both terranes with the North American ("Laurentia") plate during Late Cambrian to Tremadoc times but also documented the step-by-step "alienation" between Laurentian conodont species and the Precordilleran forms during the Early to Middle Ordovician. Many of Oliver´s achievements and good bit of up-dated information on global Ordovician developments were brought to the attention of the broader German public by subsequent newspaper articles which were triggered by reporting this award. The "Albert-Maucher-Preis" is only awarded to very outstanding young German scientists based on a case-by-case evaluation and on suggestion by an interdisciplinary board of peers; it is connected with a financial stipend of DM 20,000.- We all congratulate Oliver upon this well-

deserved achievement and wish him further challenging tasks ahead for his international research commitments and his further professional career!

BERND-D.ERDTMANN

IN MEMORIAM

VLADIMIR HAVLICEK (1922-1999)

It is with great regret to report the death of Vladimir Havlicek, one of the best specialists on (not only) Ordovician brachiopods and leader of Bohemian Ordovician research. He studied geology at the Charles University in Prague. Since 1948 until his retirement, thus his active lifetime, he worked in the Czechoslovak Geological Survey in Prague. At the beginning of his career he intensively studied sedimentary iron ores in Barrandian. However his main working activity was mapping. In high quality he mapped unbelievable area of 1500 km^2, especially in Lower Palaeozoic units. Only "by the way", out of his main workload he occupied himself with palaeontology and studied brachiopods.

His main geological as well as palaeontological interest covered Cambrian to Devonian. He started with study of Lower Ordovician brachiopods and stepwise he described and revised hundreds taxa of brachiopods. He published monographs on spiriferids, rhynchonellids, strophomenids and orthids. In stratigraphy, together with Ladislav Marek, he proposed a new stages for Bohemian (and Mediterranean) Ordovician. Together with Jiri Vanek, he revised biostratigraphy of Bohemian Ordovician. In co-operation with Milan Snajdr he published several modern papers on palaeogeography and facial development of Lower Ordovician. With demise of Vladimir Havlicek it disappears enormous field experience and theoretical potential.

PETR KRAFT, JAROSLAV KRAFT, OLDRICH FATKA AND MICHAL MERGL

VALDAR JAANUSSON (1923–1999)

With great sorrow the geologists of Estonia learned of the death of Valdar Jaanusson, an outstanding geologist and palaeontologist, in Täby, Sweden, on 8 August 1999.

V. Jaanusson was born in Tallinn (Nõmme) on 30 June 1923. Very early, already during his studies at Tallinn Gustav Adolf Secondary School in 1934–1941, he took great interest in geology. He was one of the initiators of the Gustav Adolf Natural Science Circle in 1937. It was a pupils organization which influenced early scientific activities of many, later well-known Estonian scientists and V. Jaanusson was the leader of the geology section. Several early geological observations made by him or with his contribution were later used in scientific papers, thanks to their completeness and maturity.

The studies of V. Jaanusson at the University of Tartu and Tallinn Technical University were interrupted by war in 1943. Later he emigrated to Finland, moved to Sweden, and graduated from Uppsala University in 1957 with a PhD in palaeontology. He worked as assistant, docent, and substitute for professor at Uppsala University in 1946–67. In 1966 he joined the Palaeozoology Department of the Swedish Museum of Natural History as a curator; from 1982 to 1989 he held the post of professor. He put a lot of effort into developing the department a high-level scientific institution like it is today.

V. Jaanusson's scientific interests were varied: he has contributed to different aspects of geology and palaeontology, Quaternary geology, archaeology, and anthropology, but his main papers – more than one hundred publications – deal with the Ordovician stratigraphy, carbonate sedimentology, and invertebrate palaeozoology. This contribution brought him a wide international recognition. He was considered an authority on Ordovician geology. Always ready to share his extensive knowledge with colleagues, he became a friend and mentor for many of us.

In spite of difficult times, V. Jaanusson kept a close contact with colleagues in Estonia. His efforts were acknowledged in the 1990s when he was elected Honorary Member of the Estonian Naturalists' Society and Estonian Geological Society (in 1990 and 1991, respectively) and Foreign Member of the Estonian Academy of Sciences (in 1991). V. Jaanusson's enthusiasm and optimism will be missed by all who knew him.

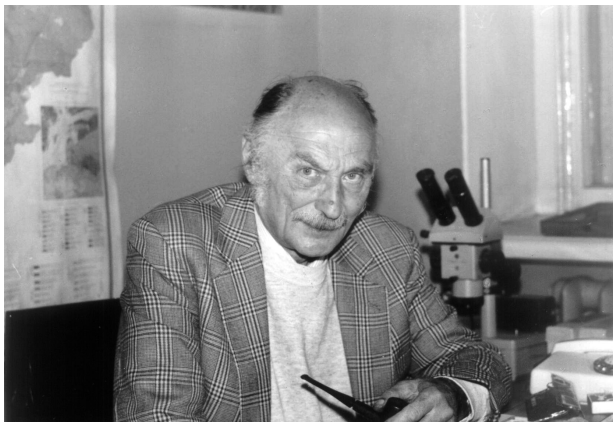
DIMITRI KALJO, TÕNU MEIDLA AND ARVO RÕÕMUSOKS

VALDAR (VLADIMIR) JAANUSSON (1923-1999)

Only a few geologists have ever reached the stature of being recognized as leaders globally in the research on faunas and rocks of a particular system. Examples of such persons include Walcott (Cambrian), Boucot (Silurian), and Arkell (Jurassic). With the untimely death of Valdar Jaanusson last year, the Altmeister of the Ordovician is no longer with us as an inspiring researcher, scientific adviser, and friend to countless Ordovician workers round the world.

Valdar Jaanusson was born on June 30, 1923 in Nomme near Tallinn, Estonia. Already in High School, he organized a group of students with the purpose of studying the Middle Ordovician in the Tallinn region. This work resulted in a 1941 report (co-authored with his student friend R. Mannil) in which, among other things, the stratigraphic significance of K-bentonites was first recognized in Baltoscandia. After High School graduation, he carried out studies at the Technical University in Tallinn and at Tartu University but in 1943, he was forced to flee to Finland where he obtained a temporary position at the Geological Survey of Finland. Further World War II developments forced him to flee to Sweden in 1944, where he enrolled as a student at Uppsala University in 1945. During the following five summers, he was the leader of a team of geology students carrying out detailed and extensive fieldwork in several Ordovician outcrop areas in central and southern Sweden. The results of these investigations, along with studies of drill-cores, were presented in a series of now classic publications that form the basis of much of the current litho- and biostratigraphy in the Swedish Ordovician. He received his Ph.D. at Uppsala University in 1957 with a dissertation on Middle Ordovician ostracodes that remains a standard reference on that subject. He was associated with Uppsala University as a docent (lecturer) up to 1961 when he accepted a position as intendent (curator) at the Swedish Museum of Natural History in Stockholm. During 1971-1972 he was Distinguished Visiting Professor at The Ohio State University in Columbus, Ohio, and in 1982 he was appointed Professor and Head of the Paleozoological Department at the Swedish Museum of Natural History. He served in that capacity to his retirement in 1989, but after retirement, he continued very active research at the musem. Most unfortunately, during the last 2-3 years he was handicapped by severe eyesight problems due to bleedings in the eyes. In the spring of 1999, he was diagnosed as having lung cancer and despite intense treatments, he passed away on August, 8. Up to near the end, he was engaged in geological research---when I talked with him for the last time in mid-July, he was quite lucid and we discussed in some detail various findings that had been presented a couple of weeks earlier in Prague at the 8th International Symposium on the Ordovician System.

Valdar Jaanusson's research in Estonia and Sweden during the 1940's was centered on Middle and Upper Ordovician stratigraphy and shelly faunas but two early papers deal with Pleistocene problems in Estonia. During the 1950's he published important monographs on trilobites, several papers on ostracodes (including the classic Ph.D. monograph),



Valdar (Vladimir) Jaanusson

and a study on Tertiary brachiopods of Patagonia. He also authored several biostratigraphic papers as well as pioneer investigations of Ordovician limestone lithology. His publications during the 1960's comprise key papers on Ordovician lithostratigraphy, biostratigraphy, and faunas that have become standard references in Baltoscandia. During this decade, he also published internationally recognized studies on graptolite morphology and biostratigraphy as well as additional papers on brachiopods, ostracodes, and carbonate sedimentology. These investigations were vigorously continued during the 1970's and 1980's and the results presented in several important publications. Examples of these include papers on faunal dynamics in Baltoscandia and eastern North America, functional morphology of ostracode shells, evolution of the hinge in articulate brachiopods, and polymorphism and morphological discontinuities in graptolite evolution. A new area of research to him, dealt with in two interesting papers, was various factors related to the development of hominid bipedal posture. In the late 1970's, he also initiated and led the Silurian Vattenfallet project, a multidisciplinary and very detailed study of the occurrence, faunal dynamics, and biotic relationships of all fossils in a unique section on Gotland. This project, which involved more than 30 specialists from 8 countries, resulted in a 294-page monograph of great general interest. His last published papers during the 1990's, which deal with Ordovician trilobites, brachiopods, graptolites, and stratigraphy, show that he had lost none of his power of observation, full grasp of the literature, and penetrating interpretation ability well after his 70th birthday.

Personally, Valdar Jaanusson came across as a friendly, interested, but generally rather low-keyed person of great knowledge and intelligence. Although it was perhaps not very evident initially, he had a good sense of humour and was a very pleasant co-worker and companion in the field and in the office. He had little interest in, and rarely attended, scientific meetings, but he was always enthusiastic about discussing virtually

any geologic matter with colleagues, students, and the many national and international visitors who came to Stockholm to see him. He was particularly helpful and encouraging to students and quite a few now well-known Ordovician workers, such as Stan Finney and Charles Mitchell, spent periods with him in Stockholm. His truly encyclopedic knowledge about a wide variety of geological fields, keen judgement, and creative scientific imagination made him a unique person to search out for advice and for testing new ideas. Apart from having a remarkable memory, he was blessed with an unusual facility for languages; he mastered his native Estonian and Russian, along with Swedish, German, and French, but he also had a good background in Finnish and Polish.

Valdar Jaanusson's work, and his person, became widely appreciated internationally. He was a Voting Member of the International Ordovician Subcommission from its establishment in 1974 to 1996. The prestigious honors he received include being elected Member of the Estonian Academy of Sciences and Honorary Fellow of the Geological Society of America. He is only the second Swedish paleontologist to have been the latter, which is a major award in view of the fact that this group includes only about 60 internationally leading geologists outside USA and among these there are extremely few paleontologists.

With the death of Valdar Jaanusson, Ordovician research has lost a leading practitioner and he leaves a void that will be very difficult, if not impossible, to fill in these times of more and more narrow specialization. He is fondly remembered by a multitude of friends and colleagues all over the world, and it is safe to predict that his scientific work will prove to be of lasting value to many future generations of Ordovician workers.

STIG M. BERGSTROM

MISCELLANEA

COMMENTS

The International Subcommission on Cambrian Stratigraphy is organising a Field Meeting (Argentina 2000) in the Precordillera and Eastern Cordillera of western and northern Argentina between August 18-25, 2000. During this meeting, the Cambrian-Ordovician transition beds at Quebrada de La Silla in the northern Precordillera will be examined.

JOHN SHERGOLD

For anyone wondering how I made out with my son Ben who developed the lung problem at ISOS Prague, I was able to get him treated at a Canadian-run medical center there and he recovered after about 10 days.

R. BOB GANIS

CURRENT RESEARCH

ACEÑOLAZA, GUILLERMO F. (Argentina). During all 1999 I´ve been working for a second year in Spain with J.C. Gutiérrez-Marco (grant finishing in April 2000, and given by the Argentine Research Council - CONICET). The work was focused on faunal dynamics of the western and northwestern margin of Gondwana, as well as some new biostratigraphic data from northern Argentina and southern Bolivia (echinoderms, trilobites, molluscs and trace fossils).

AINSAAR, LEHO (Estonia). I´m continuing to work on carbonate sedimentology and stable isotope geology of Caradocian (with Tõnu Meidla and Tõnu Martma) and with detailed stratigraphy and sea-level history of Arenigian in Baltoscandia (with Tõnu Meidla, Andrei Dronov and Oive Tinn).

ALBANESI, GUILLERMO L. (Argentina). After having completed a PDF term in Victoria, Canada, under the supervision of Chris Barnes, I´m back in Argentina. I have a new research position to continue working on lower Paleozoic conodonts from Argentina (mainly taxonomy, biostratigraphy and paleobiogeography). I´m involved in diverse biostratigraphic projects on Cambrian-Ordovician conodont faunas from the Precordillera, the Famatina System and Northwestern Argentine basins, with several colleagues from different Argentine universities. A biostratigraphic scheme for the C/O boundary interval in western Argentina is being worked out. We continue developing the conodont-graptolite biostratigraphic ties (with Gladys Ortega) for regional and intercontinental correlation, particularly focused on the base of the Lower, Middle and Upper Ordovician Series in Argentina.

ALDRIDGE, RICHARD J. (United Kingdom). The project on the exceptionally preserved fossils from the Soom Shale continues with Sarah Gabbott and Hannes Theron; we are currently waiting to hear if we have obtained funding for a new round of excavations in South Africa.

BAGNOLI, GABRIELLA (Italy). I am actively working on Middle Ordovician chitinozoans and Cambrian - Lower Ordovician conodonts from Newfoundland, and on

Lower-Middle Ordovician conodonts from Baltic regions. I am also working on Upper Ordovician conodonts from the Carnic Alps in cooperation with E. Serpagli and A. Ferretti.

BARNES, CHRIS (Canada). I continue to expand field-based Lower Paleozoic conodont studies in the Canadian Cordillera. Detailed platform to basin transects have been sampled in the southern, central and northern Rocky Mountains (with Lee McKenzie McAnally and Leanne Pyle as Ph.D. students). The central Rockies transect involved remote alpine field work in 1998 and 1999. Jianqin Chen is nearing completion of his Ph.D. work in Ordovician conodonts from North and South China. Shunxin Zhang has started a new PDF project using my extensive conodnt database to relate conodont biostratigraphy, biofacies and biogeography to the pattern of eustasy and tectonism that affected northern Laurentia in the early Paleozoic. We are completing some work on undescribed Early Llandovery conodonts from Anticosti Island, Quebec. Guillermo Albanesi completed a PDF in late 1999, primarily continuing work in Ordovician conodonts from Argentina, and returned to a new research position in Argentina. Jianhua Zhang has started a PDF with initial work on describing the Ordovican conodonts from the Stokes Siltstone , Amadeus Basin, Australia. David Jowett (M.Sc. student) is studying the well preserved latest Ordovician to lower Ludlow conodont fauna of the Cape Phillips Formation (slope facies), Arctic Islands. Work completed, nearing completion or in process includes: Ashgill conodonts (Whitland section, South Wales with Annalisa Ferretti); upper Ordovician conodonts from the Bowan Park succession, N.S.W., Australia (Geobios, 1999); Ordovician Nd isotope work (with Cindy Wright and Stein Jacobsen, one paper in press, one in preparation); modelling the Ashgill glaciation (recent paper in Paleoceanography with Pascale Poussart and Andrew Weaver); Ordovician conodonts of Tarim Basin, China (2 paper s in preparation with Zhixin Zhao); evolutionary study of *Paroistodus originalis - P. horridus* transition (with G. Albanesi, in press, Jour. Paleontology); Arenig slope facies conodonts from the Cow Head Group, Newfoundland (with David Johnston, 2 part issue in Geologica et Paleontologica, 1999 and 2000). As part of the work with the Subcommission, contributions have been made with regard to the base of the Ordovician and to the base of the second Stage. I will have a year's sabbatical leave from July 2000.

BATCHELOR, RICHARD A. (United Kingdom). In September 1999 I presented a poster entitled "Does the Ordovician 'Big Bentonite' exist in Scotland?" at the Southern Uplands Terrane conference. After years of searching, only a few thin clays have been found in the *D. multidens* Biozone in Scotland, leading to the conclusion that the blast which generated the Kinnekulle metabentonite, and lesser deposits in Norway and Estonia must have missed Scotland. Even the Deicke and Millbrig events in the USA didn't affect Scotland. Maybe the wind was blowing the wrong way!

BATES, DENIS (United Kingdom). I am actively working (with Nancy Kirk) on the ultrastructure of Ordovician graptolites, including Tremadocian dendroids from England, and mid Ordovician graptoloids from the Viola Springs Limestone of Oklahoma. Other work is on the mid Ordovician *Mastigraptus*, with Adam Urbanek of Warsaw.

BEDNARCZYK, WIESLAW STANISLAW (Poland). I'm actively working on the Ordovician biostratigraphy of Poland, especially northern and central (Holy Crosss Mts) Poland on the basis of microfossils(conodonts, microscopical Lingulata brachiopods and chitionozoa).

BERESI, MATILDE SYLVIA (Argentina). I'm actively working on the biostratigraphy, calcareous microfacies and depositional paleoenvironments of the carbonate platform sequences from the Middle and Upper Ordovician, central and eastern Precordillera of San Juan, with collaborators in the San Juan University. Additionally, together with Susana Heredia (Conodont fauna) I am working on the Ordovician stratigraphy, sponge fauna and associated microfossil groups from the Precordillera of Mendoza. I am continuing my study on associations of sponge spicules and sponges from the Cambrian and Ordovician of the Argentine Precordillera. A paper (with S.Heredia) on sponge spicule assemblages from the Middle Ordovician of Ponón Trehúe area, southern Mendoza province, will be published in January 2000 in the Revista Española de Paleontología.
Project PEI-CONICET, 1999: Ordovician Conodonts and Biostratigraphy of the Sierra Pintada Range (Mendoza Province) and the Limay Mahuida Range (La Pampa Province). With S.Heredia Comahue University, Neuquén, Argentina.
Project San Juan University, San Juan, Argentina, 1999: The Upper Ordovician and Lower Silurian of the La Trampa Range, San Juan Precordillera, Argentina. With S. Peralta, San Juan University, San Juan, Argentina.

BERGSTRÖM, STIG M. (U.S.A.). I am involved in a number of projects in Baltoscandia, the People's Republic of China, South America, United Kingdom, and North America, most of which deal with conodonts, graptolites, K-bentonites, and Ordovician
global stratotypes.

BLIECK, ALAIN (France). My activities on Ordovician vertebrates have been weak during the last years. However, a close contact has been established with Pr. B.-D. Erdtmann, from the Technical University of Berlin (Germany), who discovered a few remains which might be of vertebrate origin. They come from a graptolite-dated early Arenig siliciclastic series of southern Bolivia. This material is still under study with Pr. H.-P. Schultze in the Natural History Museum of Humboldt University, Berlin.

BOTTING, JOSEPH (United Kingdom). I'm in the final year of a PhD, investigating the ecological effects of ash-fall in the Ordovician of the Welsh Basin, particularly the Builth Inlier. This study covers a range of environments, incorporating macrofossils and some microfossils. The results indicate extensive localised plankton and benthic blooms under certain conditions; I hope to continue this research by examining the effects on evolutionary rates when these conditions were widespread (such as the Ordovician…). Taphonomic work (rapid silicification and the impact of ash deposition) is also on the agenda. Taxonomy of rare groups includes an important shallow siliciclastic sponge fauna, echinoderms and palaeoscolecids. I intend to keep working on Lower Palaeozoic sponges until someone stops me.

BRABCOVA, ZDENKA (Czech Republic). I am an undergraduate student of paleontology at faculty of natural sciences in Charles University in Prague (Czech Republic). My graduate work is on the field of palaeozoology of invertebrates. I study the group Conulariids of Lower and Middle Ordovician of Prague Basin (Barrandien). I would like to obtain some news on Conulariids all of the world.

BROCKE, RAINER (Germany). I am continuing my work on Ordovician palynology in China. The research concerns biostratigraphy of acritarchs from the Tremadoc-Arenig boundary (together with Olda Fatka), and the Arenig-Llanvirn boundary/Darriwilian (together with Li Jun). Since 1999 I am involved in a project of the Nanjing Institute of Geology and Palaeontology, Academia Sinica which deals with the ecology of fossil algae (including acritarchs) from the Upper Ordovician - Lower Silurian interval in China. This project is carried out together with Li Jun and Li Yue from Nanjing.

BRUSSA, EDSEL DANIEL (Argentina). I am actively working with Ordovician graptolites from the Precordillera and Northwestern Argentina. In the Precordillera the work is focused, principally, in the Yapeenian and Darriwilian faunas, although we are also analyzing Ashgillian associations from the western tectofacies. In Northwestern Argentina the work is concentrated in the western border of the Eastern Cordillera and in the Puna region. Actually I am studying new graptolites assemblages from volcanic-sedimentary rocks in the Huancar area. A reexamination of the Rusconi and Loss collections from the museums of Mendoza and Jujuy, respectively, is going on.

BUATOIS, LUIS ALBERTO (Argentina). I am working on paleoenvironmental reconstructions and sequence-stratigraphic interpretations of Ordovician shallow-marine successions of northwest Argentina.

BUDIL, PETR (Czech Republic). Recently I am finishing the revision of the dalmanitid and calmonid trilobites of the Ordovician and Silurian of Prague Basin. Contemporaneously, with I. Chlupac, O. Fatka, J. Kraft, P. Kraft, J. Slavickova, R. Mikulas, M. Bubik and P. Hradecky, we are preparing complex study on very important large temporary outcrop in lower part of the Sarka Formation (? uppermost Arenigian – lowermost Llanvirnian) in classical palaeontological area Praha - Cerveny vrch. I have submitted in print two short papers (one with J. Slavickova) about interesting palaeontological localities from Ordovician of the Prague Basin. I am also preparing the paper on comparison of the early schizochroal eyes of Lower and Middle Ordovician dalmanitid and pterygometopid trilobites and eyes of some living arthropods.
Other activities: Member of the organisation committee (Chairman J. Kriz) of the anniversary meeting ProGEO (The European Association on the Conservation of the Geological Heritage, http://www.sgu.se/progeo) Prague, June 1-9. 2000.

CARRERA, MARCELO G. (Argentina). I´m actively working on paleoecology of the lower Ordovician fossil associations of carbonate rocks in the Argentine Precordillera. These studies include biofacies and community recognition, distribution and evolution. I´m also continuos working on taxonomy and biogeography of lower Ordovician sponges and bryozoans.

CHEN, XIAOHONG (China). I is currently involved in the project on the Lower Paleozoic litho-, bio- and sequence stratigraphy in the Yangtze Gorges area with Xiaofeng Wang. Besides, I am continue to work on Ordovician and Silurian chitinozoan in South China with Wang Xiaofeng. Results will be present in the end of this year.

CHOI, DUCK K. (Korea). I am currently working on the Cambrian-Ordovician stratigraphy and trilobites of Korea. Last year we located new Ordovician fossil

localities from the Mungok Formation in Tanyang area, which forms a part of the MS thesis project of J.W. Sohn. This year we will be deeply involved in a new five-year project dealing with the comprehensive survey on the Cambro-Ordovician Choson Supergroup in Korea.

CHRISTIANSEN, JØRGEN LØYE (Denmark). I am actively working on using oceanic circulations patterns in combination with palaeobiogeographical data to reconstuct the palaeogeography of the Ordovician.

CHUANSHAN WANG (China). I am currently involved in the study on the Lower Paleozoic litho-, bio- and sequence stratigraphy in the Yangtze Gorges area, being in charge of Wang Xiaofeng and mainly dealing with Ordovician graptolites. A result on occurrence of multiramosus graptolites and sea level changes will be published in "Geology and Mineral Resources of South China" (no.1, 2000).

CINGOLANI, CARLOS ALBERTO (Argentina). I am actively working on the Ordovician of the SAN RAFAEL BLOCK region (Mendoza Province, Argentina) as follows, a. Basement rocks of the Ponon Trehue carbonate ordovician sequences. These igneous-metamorphic rocks were named Cerro La Ventana Formation. Six granitoid samples were collected and processed by Rb-Sr whole rock geochronological method. The age yielded by isochrone model is of 1063-106 Ma (2 sigma), with an 87Sr/86Sr initial ratio of 0.7032 - 0.0001. The data are important for the evaluation of the Mesoproterozoic crust as a Grenvillian belt, in the mid-west of Argentina, as a basement of Lower Palaezoic sequences in Precordillera and a continuation to the South in the San Rafael Block, stretching from La Rioja to Mendoza Provinces. b. Litoestratigraphy of the Ordovician siliciclastic from Cerro Bola. The Pavon Formation, is composed by 700 m of tabular sandstones, siltstones ans shales and it is intruded by rhyolites (Permian-Triassic age). Special attention was focused to elucidate the stratigraphy, sedimentology and structural aspects in close relationship with the regional tectonic framework: a Precambrian basement (Grenvillian age) to the East and a sedimentary basin to the West. A graptolite fauna was also found mainly in black shales and siltstones in all the Pavon Formation. The age of this Ordovician deep sea sequence is Lower Caradoc, Climacograptus bicornis Biozone. The sandstone detrital modes show a recycled orogen and continental block provenance. Paleocurrents suggest that the source area was located in the Eastern. This unit was interpreted as a sandy turbidite. New research is comming up in the Pavon Formation, specially geochemistry, geochronology of detritic minerals, and paleomagnetic data. All of these information will be useful for comparison and correlation aspects with Ordovician siliciclastic from Precordillera belt. Precordillera region: I continue working in the Ordovician explosive volcanism (K-Bentonites) in the Argentine Precordillera, specially in stratigraphical, geochronological, geochemical, mineralogical and paleogeographical aspects. The comparison of Ordovician K-Bentonites in Laurentia, Baltica, Avalonia and Western Gondwana (Argentina Precordillera) was analysed with the new data. This is a research started in 1995 in a scientific agreement with NSF (W. Huff, S. Bergstrom, D. Kolata) and CONICET (C. Cingolani, A. Cuerda, R. Astini).

COCKS, ROBIN (United Kingdom) is continuing work on global Lower Palaeozoic geography (with Richard Fortey and postdoc David Lees) by trying to integrate brachiopod, trilobite and other fossil records of importance with the palaeomagnetism. Having evaluated the North Atlantic area, active work is chiefly on the belt from Turkey, through the Middle East, Kazakhstan and the Himalayan fragments down to Burma, China and Thailand. He is also organising the Millennium Brachiopod Congress in London in July (registration still open - please e-mail).

COOPER, ROGER A. (New Zealand). Current projects include a revision of the Ordovician and Silurian time scales with Pete Sadler (UC Riverside) using the automated graphic correlation programme CONOP (Constrained Optimisation); over 100 graptolitic sections are now incorporated into the composite and the methodology, still being developed, looks good for a finely calibrated scale. Another time scale project is the Early Paleozoic part of the revised global Geological Time Scale (Gradstein and Ogg, conveners). Macroevolutionary rates of Ordovician graptolites, and measures of diversity, part of which lies within the Great Ordovician biodiversification project, are other graptolite projects. Recently completed is the Proposal for the GSSP for the Cambrian/Ordovician boundary, and an account of the Cambrian history of the New Zealand Takaka Terrane (with Carsten Muenker).

COOPER, TONY (United Kingdom). The thematic Geological Survey Memoir describing the Skiddaw Group has been completed, thanks to the editing and contributions of Richard Hughes and Phil Stone. It is now progressing to publication, hopefully within the coming year.

COPE, JOHN (United Kingdom). I am continuing work on Ordovician bivalves and hoping to rediscover some

'lost' localities in Wales that have yielded some remarkably preserved fossils in the past. I am also describing small Arenig gorgonian faunas discovered in the course of other collecting. The Geological Society has republished the 1992 palaeogeographical atlas of the UK of which I was the co-ordinating editor. The original A3 edition had to cover substantial publishing costs of the complex maps, but these now having been covered, the new A4 edition is available for only £35 to Fellows of the Geological Society. The only updating is a single editorial page bringing the reader's attention to new dates etc-

COPPER, PAUL (Canada). We continue active work on the Rawtheyan-Hirnantian section of Anticosti island, c.400m thick. The Hirnantian component alone is c. 70m thick, and contains two reefal horizons, one at the base of the prinsta Mbr and the second ending at the O/S boundary, which has no hiatus. Post extinction was marked by shallow water, storm-moved calcarenites with impoverished and dawrfed faunas.The final Rawtheyan reefs occur about 12m below the top of the Vaureal Fm. Each of the three reef sequences contains very different faunas and calcimicrobes. Our evidence indicates that there were three regressions terminating each reef cycle, followed by three flooding events. Flooding marks the upper *pacificus* Zone (Schmitt Creek Mbr shales), the upper Grindstone Mbr-Velleda Mbr (*extraordinarius*) , the upper Prinsta-Lousy Cove-Laframboise Mbrs (*persculptus*) , and the lowermost Becscie (Silurian defined as the base of the *acuminatus* Zone. We have set up an Anticosti Working Group: membership available via email. Check also our website at www.laurentian.earth sciences.

CUERDA, ALFREDO J. (Argentina). I am working on the Ordovician sequences exposed in the San Rafael Block, southern Mendoza, as well as those in the Precordillera of western Argentina. The first activities were carried out in the sedimentary sequence named as Pavon Formation exposed in the eastern slope of the Cerro Bola region. There were recognized three graptolite associations of the upper Ordovician age (Caradoc). The relationships between these associations and the sedimentology of the bearing graptolite rocks also were stablished. New stratigraphical researches were carried out in the whole Pavon Formation outcrops. There were studied biostratigraphic aspects, provenance of sandstones, paleocurrents, structural framework and relationships with the gondwanic rhyolites.
In the Gualcamayo Formation (Precordillera of La Rioja and San Juan) was recognized a new graptolite taxa which allow to improuve the age of the Upper Ordovician sequence. Dendroid graptolites have been studied in the Los Azules Formation at Las Plantas and La Chilca sections, which are associated with graptolites of Caradoc age.
In the upper levels of the Ordovician sequence at Guandacol region (Las Vacas Conglomerate and Las Plantas Formation) there were recognized two different graptolite associations: one of allochtonous origin which is found in the pebbles of the Las Vacas Conglomerate an another authochtonous intercalated in black shales between the coarse conglomeradic sediments.
The graptolite Neurograptus cf. N. margaritatus, has been identified for the first time in Argentina, and was found in Cantaro de Oro Formation, at the Invernada Range (Precordillera of San Juan).
The authorities of the Argentine Geological Association invited me to developed a chapter on the evolution knowledge of the Lower Palaeozoic of Argentina.

DROSER, MARY L. (U.S.A.). I am continuing work in the Great Basin on the paleoecology of the Ordovician Radiation. I currently have a number of students on this issue. Seth Finnegan is examining the nature of changes across the Ibexian-Whiterockian boundary in terms of fossil abundance and diversity. Diana Thiel is working on brachiopod shell beds and Bob Gaines is studying bioturbation and preservation in mudstones. Peter Sheehan and I are documenting the large-scale patterns through which the Paleozoic fauna comes to dominant shelfal settings during the Ordovician. Richard Fortey, Andy Gale and I are continuing work on aspects of the Ibexian-Whiterock boundary in carbonate platform settings. I am also continuing my work on Ordovician biofabrics.

EBBESTAD, JAN OVE R. (Sweden). I am continuing my research on Ordovician univalved molluscs and gastropods, with special reference to Baltoscandian material. Special attention is directed towards the Upper Ordovician fauna, working closely with Mare Isakar (Tartu, Estonia). During 2000 I hope to initiate work with Paul Copper (Sudbury, Canada) on Anticost Island gastropods. Besides gastropod research I am involved in investigations of the Ordovician fauna of the central Taimyr Peninsula, Russia.

EGENHOFF, SVEN (Germany). I am about to finish my PhD dealing with Ordovician basin evolution in southern Bolivia, funded by the German National Science Foundation (DFG). This work provides a first insight into the complex sedimentology of the region and establishes a geotectonic model with implications for the paleogeography of the southwestern Gondwana margin. Furthermore, I am working on a biostratigraphic zonation based on graptolites for the Lower Ordovician

shelf succession together with Jörg Maletz and Bernd Erdtmann.

ELIAS, BOB (Canada) is studying various aspects of corals and environmental change during the Ordovician radiation, mass extinction, and Early Silurian recovery. Research with Graham Young focuses on the diversity, paleoecology, community structure, and morphologic trends of coral faunas. A collaborative project is underway with Graham, Godfrey Nowlan, Dave Rudkin and others on a spectacular Late Ordovician-Early Silurian archipelago with rocky shorelines, exposed in the Churchill area of northern Manitoba. Dong-Jin Lee (Korea) and I are examining the paleobiology of Ordovician tabulate corals. Research with Xu Shaochun (recent Postdoctoral Fellow) on the latest Ordovician solitary rugosans of South China is nearing completion. Adam Melzak (Ph.D. student) is working on the Late Ordovician to earliest Silurian rugose corals of Anticosti Island, Quebec. Simon Wong (M.Sc. student) is studying the paleoecology and paleoenvironments of the famous "Tyndall Stone" in southern Manitoba. M.Sc. and Ph.D. projects are available; see http://www. umanitoba.ca/ faculties/science/geological_siences/faculty/elias/ elias.html for information.

ERDTMANN, BERND-D. (Germany) is now concentrating his research with emphasis on two major aspects: 1. Global correlations and descriptions of "Hunnebergian" (upper Tremadoc) graptolites (with Petr Kraft) and acritarchs (with Thomas Servais, Lille and Olda Fatka, Prague) and 2. Biodiversity patterns of Ordovician plankton and their potential causal relationships with paleoclimates or other factors (IGCP 410 cooperation project with Roger Cooper, N.Z, application for support by DFG is under review). Both projects will heavily lean on data and samples from one of the most extensive Ordovician graptolite collections, based upon cm scale measured sections from around the world, which is curated here at TU Berlin (Berlin Graptolite Repository). New sections of graptolitic Tremadoc are targeted to be measured and sampled on cm-scale in the Oslo Region, Norway and in Victoria, Australia during the forthcoming 2 years. Based on these two interconnected projects a new graptolite zonal scheme for the entire Tremadoc will be worked out and proposed. Strong emphasis will be given to evaluate the controls of graptolite provincialism during Tremadoc based on rich material from Bolivia (Tarija region), western Newfoundland (allochthonous Cow Head Group), the Oslo Region (Norway), Victoria (Australia) and Aorangi Mine, Nelson District, N.Z. (with Roger Cooper) and special sections from China (Zhejiang and Jilin, with Zhang Yuandong). Selected material from the Berlin Graptolite Repository at TUB may also be subjected to acid treatment for isolation of acritarchs and chitinozoans. Dr. Zhang Yuandong (Nanjing, China) will start working at TUB under a Academia Sinica/Max-Planck-Ges. cooperative program starting in November 2000. He will be most strongly involved in the above projects with special attention given to excellent Tremadoc graptolite material from the Dayangcha sections in Jilin, northern China and from the Jiangshan, Zhejiang and other shelf marginal sections on the Yangtze Platform of southern China.
I am now more involved in a rather extensive collaborative project on the "Late Neoproterozoic/ Cambrian Bio-Radiation Event: A Multidisciplinary Approach to Bio-Earth-System Evolution: Geophysiology of the Yangtze Platform, China". This "bandworm" is supposed to explain it all but in short, the main target are the first fossilized remains of metazoan life and their environments on the Yangtze Platform. I am the coordinator of this project which involves about 4 German paleontologists, 4 German geochemists, 1 or 2 sedimentologists and a similar no. of geoscientists from China. This keeps me busy - besides teaching and plenty of administration...

ETHINGTON, R. L. (U.S.A.). I am continuing my work on Lower and lower Middle Ordovician conodonts of central and western United States. I shall retire from active teaching at the University of Missouri-Columbia effective August 31 but will continue with research already under way (and some projects only just germinated).

FERRETTI, ANNALISA (Italy). I am continuing my research on Late Ordovician conodont faunas mostly from southern Europe. Extensive sampling of some Late Ordovician sequences exposed in Brittany (NW France) was recently completed together with French and Italian colleagues. A global report on the biostratigraphic and paleogeographic implications of the conodont fauna from southern Sardinia (Italy) with E. Serpagli was published in the ECOS VII Conodont Symposium Volume.

FINNEY, STAN (U.S.A.) maintains several on-going projects. 1) Base of Upper Ordovician Series: During 1999 he re-examined candidate stratotype sections at Calera, Alabama and Fagelsang, Sweden. On the basis of this recent work, Stan, Stig Bergstrom, and colleagues are proposing the Fagelsang section as the global stratotype for the base of the Upper Ordovician Series defined on the base of the *Nemagraptus gracilis* graptolite zone. 2) Ordovician stratigraphy and graptolite biostratigraphy of Roberts Mountains allochthon, central Nevada: during the summer 1999, Silvio Peralta (from

San Juan, Argentina) and I collected lower Upper Ordovician section to examine graptolite biostratigraphy from *bicornis* to *spiniferus* zones; also continuing to extend stratigraphic studies from Roberts Mountains into other mountain ranges in north-central Nevada. 3) Completed an interdisciplinary project with James Gleason (geochemist at U. of Michigan) using combined neodymium isotope stratigraphy and graptolite biostratigraphy to examine timing and nature of sediment dispersal from Taconic orogen along southern margin of Laurentia in early Late Ordovician.

FORDHAM, BARRY (Australia). I am working on Ordovician - Lower Carboniferous geology of Queensland, Australia and on the Paleozoic time scale.

FORTEY, RICHARD (United Kingdom). I am glad to report that the Correlation Chart of the Ordovician Rocks of the British Isles has been submitted for publication by the Geological Society of London, after a very long gestation. Zhang yuan-dong has been with me at the Natural History Museum in London working on sinograptid graptolites.

FREY, ROBERT C. (U.S.A.). I am still trying to work on Ordovician cephalopods and pelecypods when I am able to. Ongoing projects include (1) a systematic study of primarily Upper Ordovician nautiloids from a pre-Beaverfoot unit in southeastern British Columbia with the Canadian Geological Survey; (2) a comprehensive study of the diverse nautiloid fauna from the Platteville Group in NC Illinois and SC Wisconsin USA with John Catalani (Illinois); and (3) a proposed study of Lower and Middle Ordovician nautiloids from the Argentine Precordillera with Matilde Beresi (Mendoza). In addition, Barry Webby approached me to coordinate the "Nautiloid Clade" as part of the ICGP 410 Project on Ordovician Biodiversity. To date, I have recruited Olga Bogolepova (Sweden), David Evans (UK), Alex King (UK), and Matilde Beresi (Argentina) as fellow contributors.

GANIS, G. ROBERT (U.S.A.). I am continuing my work on the graptolite biostratigrapy of the Taconic "Hamburg klippe" and associated Martinsburg Formation in Pennsylvania ,USA with Henry Williams and John Repetski (for conodonts). A large part of the work is under review for publication (revised resubmission with tenative acceptance). We hope to look at the nearby Cocalico terrane for Graptolites and conodonts this year as well.

GONCUOGLU, YAKUT (Turkey). I´m actively working on the Ordovician conodonts in the Lower Palaeozoic carbonates of the Tauride-Anatolide Platform.

GUTIÉRREZ-MARCO, JUAN CARLOS (Spain). Repport of activities I am actively working on biostratigraphy, palaeobiogeography and faunal dynamics of Ordovician graptolites, molluscs, echinoderms, inarticulate brachiopods and ichnofossils, in the peri-Gondwanan area of SW Europe, North Africa and South America. Also I am interested in the Middle and Upper Ordovician chronostratigraphy and biochronology of the northern Gondwanan domain, and I am trying to contribute to the geological infrastructure on Ordovician and Silurian rocks in the Iberian Peninsula. To my 17 short papers on diverse Ordovician subjects from Argentina, Bolivia, Spain, Portugal, Bulgaria and Jugoslavia produced this year, It should be added a large paper now in press on the Middle Ordovician biostratigraphy of NW Spain, and a tent of small "Silurian" papers. In the last phase of preparation THERE are??? several contributions on the Early Ordovician graptolites from Argentina, the Middle Ordovician biodiversity of the Moroccan Anti-Atlas, an ichnotaxonomical review of Ordovician coprolites, and a reassessment of Ordovician fossils from Bulgaria.

HARPER, DAVID A.T. (Denmark) is currently working on a number of projects involving Ordovician brachiopods and stratigraphy. In Ireland I am revising several lower (with Denis Bates) and middle Ordovician (with Matthew Parkes) brachiopod faunas and continue to work with colleagues on the Caledonian terrane history of the island. The revised correlation of Ordovician rocks in the British Isles is now in press and includes a chapter by Dave Harper and Matthew Parkes on Ireland. My work on the Upper Ordovician brachiopods of the Girvan district, SW Scotland continues as do projects with David Bruton and Alan Owen on Ordovician brachiopods from Norway. Collaboration with Enrique Villas on some Sardinian and Spanish brachiopod faunas continues and work has been completed with Owen Sutcliff and his colleagues on some North African Hirnantian brachiopods. A new project on various Ordovician brachiopod faunas from the St Petersburg region involves collaboration with colleagues in Russia including Andrei Dronov together with Eva Egerquist, Lars Holmer, Arne Nielsen, Leonid Popov and Svend Stouge. Svend Stouge and I now have financial support to develop a field programme with colleagues on central East Greenland investigating the stratigraphy and faunas of this part of the Laurentian margin. Work continues with colleagues on a correlation chart for the Ordovician of Baltoscandia and this is being integrated with the progress of the Baltoscandian group in IGCP project 410. Finally I am also coordinating the brachiopod clade group for this project.

HEUSE, THOMAS (Germany). Recently I got a new - and hopefully stable - position at the Geological Survey of Thuringia, Germany. I am responsible for mapping and stratigraphy of Lower Palaeozoic sequences in Thuringia including the Cadomian basement. I will continue palynological work in this sections.

HINTS, LINDA (Estonia). I'm continuing the study of Ordovician stratigraphy and distribution of brachiopods in the frame of the project "Changes of the Ordovician biotas along the onshore-offshore transect in the Baltic Paleobasin" (1998-2000). Some results (in cooperation with L. Sarv and E. Sammet) on the Haljala Stage in the East Baltic were presented on the Fourth Baltic Stratigraphical Conference in Jurmala (Latvia). In collaboration with D. Kaljo, T. Martma, A. Oraspold and others I'm continuing the study of uppermost Ordovician in Estonia, main attention being on the correlation of sections in northern and southern Estonia, where the topmost Ordovician is represented by facially different sequences and different faunal associations. Some aspects of the carbon isotope excursion and coeval biotic-environmental changes in the late Ordovician were reported on the 8th International Symposium on the Ordovician System in Prague (a paper by Kaljo, D., Hints, L., Hints, O., Martma, T. And Nolvak, J.).

HINTS, OLLE (Estonia). I'm in the middle of my four year PhD project devoted on the taxonomy and distribution of Ordovician jaw-bearing polychaetes (scolecodonts) in Baltica. In collaboration with Jaak Nõlvak and other colleagues I'm also concerned with problems of regional stratigraphy and together with Tarmo Kiipli I'm continuing investigation of some aspects of the Ordovician K-bentonites in Estonia.

HOEL, OLE A. (Norway). I am hoping soon to begin a study of the Raphiophorid trilobites of the Oslo Region, Norway. In the meanwhile two articles describing the lowermost Arenig (*Tetragraptus approximatus* Zone) trilobites of the Oslo Region has been printed.

JIN, JISUO (Canada). I am currently working on the taxonomy, evolution, biostratigraphy, paleoecology, paleobiogeography, extinction, and recovery of Late Ordovician-Early Silurian brachiopods of major sedimentary basins of Canada.

KALJO, DIMITRI (Estonia). I am continuing studies together with Linda and Olle Hints, Tonu Martma and Jaak Nolvak in two directions: 1) Late Caradoc Ashgill stratigraphy and environmental changes in East Baltic according to stable isotope and some biotic data (in part jointly with P. J. Brenchley and J. D. Marshall, Liverpool). 2) Rugose coral assemblages in the latest Ordovician of Estonia (partly together with B. E. E. Neuman, Bergen).

KEY, MARCUS M., JR. (U.S.A.). I am on sabbatical in Ireland working with Patrick N. Wyse Jackson (Department of Geology, Trinity College, Dublin 2, Ireland). We are investigating carbonate production rates in Ordovician bryozoans from the Tramore Limestone Formation in southeastern Ireland. This high paleolatitude LMC bryozoan-rich fauna makes it ideal for the study. We will be using oxygen isotopes preserved in the bryozoan skeletons to determine colony age by counting annual water temperature cycles. From the skeletal growth rates, we will calculate carbonate production rates. The methodology was refined by Abigail Smith (Department of Marine Science, University of Otago, New Zealand) in a pilot project on living bryozoans on the Otago Shelf.

KRAFT, JAROSLAV (Czech Republic). I described some new dendroids from Bohemian Ordovician. Together with Petr Kraft a revised biostratigraphic scheme of the Bohemian Ordovician was published. I have continued a study of the Lower and Middle Ordovician graptolites and stratigraphy. Currently I study some azygograptids, ptilograptids and some enigmatic graptolite-resembling fossils together with my son Petr.

KRAFT, PETR (Czech Republic). I finished my research under the Alexander von Humboldt Fellowship at the Technical University in Berlin by Bernd-D. Erdtmann. A revised biostratigraphic scheme of the Bohemian Ordovician was published together with Jaroslav Kraft. New interpretations of the oldest chaetognath were published with Oliver Lehnert and Jiri Fryda. I have continued a study of the Lower and Middle Ordovician graptolites, problematic fossils and stratigraphy. Currently I study some azygograptids, ptilograptids and some enigmatic graptolite-resembling fossils together with my father Jaroslav. I also co-operate with Bernd-D. Erdtmann, Jorg Maletz, Oliver Lehnert.

KUGLITSCH, JEFF (U.S.A.) is presently working on paleoecology of Upper Ordovician ostracodes from the Maquoketa Group in northeastern Wisconsin and early Silurian (Aeronian) ostracodes from southeastern Wisconsin.

LANDING, ED (U.S.A.). A manuscript in press with "Geological Magazine" (Landing, E., S.A. Bowring, K.L. Davidek, A.W.A. Rushton, R.A. Fortey, and W. Wimbledon, "Cambrian--Ordovician boundary age and duration of the lowest Ordovician Tremadoc Series

based on U-Pb zircon dates from Avalonian Wales") establishes a Cambrian--Ordovician boundary age of 489 +/- 0.6 Ma on two thin volcaniclastic sandstones immediately below the lowest occurrence of Rhabdinopora faunas. This new date, taken with a 483 +/- Ma date within the upper Tremadoc of Nova Scotia (landing et al., 1997, Canadian Journal of Earth Sciences) considerably shortens previous estimates of the duration of the Tremadoc. Another project undertaken with S.R. Westrop establishes the upper conodont Fauna B interval--Rossodus manitouensis Zone as an unconformity-bound depositional sequence across eastern New York State and western Vermont.

LEATHAM, W. BRITT (U.S.A.). I am continuing biostratigraphic documentation of Late Ordovician sequence boundaries and conodont biostratigraphy of the southern Great Basin in eastern California and southern Nevada with John Cooper (CSU Fullerton) and several undergraduate students.

LEHNERT, OLIVER (Germany) is continuing his main project on Cambro-Ordovician conodonts from the forgotten dolomites of the southwestern Great Basin. He is concentrating on a biostratigraphic framework for the sequence stratigraphy in the Ordovician Pogonip Group and Eureka Quartzite of southern Nevada and eastern California. He is working on conodonts from glacial erratics in northern Germany, on other microfossils in his residues from different countries together with several collegues and friends, and he is still interested in Cambro-Ordovician material from South America. Last Summer he participated in a joint project of the German "Geologische Bundesanstalt" and the Canadian Geological Survey to study the composition of Tertiary conglomerates (with pebbles of mainly Cambro-Silurian ages) on Ellesmere Island (Canadian Arctic). For basic information he sampled Upper Cambrian through Silurian sections in the "hinterland". Godfrey Nowlan and he will work together on the corresponding conodont faunas this year.

LENZ, A. C. (Canada). Dennis Jackson (UK) and I are collaborating on a study of upper Tremadoc (La1b and La2) graptolites from northern Yukon. The sequence, which is virtually fully exposed in the Peel River canyons of the Richardson Mountains, is richly fossiliferous, and is among the finest upper Tremadoc succession in the world. Between the lower Tremadoc *Staurograptus-Anisograptus* Biozone, and the lowest Arenig *Tetragraptus approximatus* Biozone, we recognize five biostratigraphic units. These, from lowest to highest are: *Psigraptus, Paratemnograptus Adelograptus* (=La1b), *Adelograptus antiquus*, *Kiaerograptus pritchardi*, and *Paradelograptus kinnegraptoides* (=La2), biozones.

LESPERANCE, PIERRE J. (Canada). I am now retired and inactive in Ordovician affairs, although I am still interested in Ordovician affairs. This is probably pertinent to your compilation. I was formerly at the Department of Geology, University of Montreal, P.O. Box 6128 Montreal CANADA H3C 3J7, and my email address at the University will be active indefinitely.

LINNEMANN, ULF (U.S.A.). In general I work since 1986 on the peri-Gondwanan Cadomian and Cambro Ordovician sections in central Europe. During the last years I have been working on the sequence stratigraphy and the geochemistry of the Ordovician of the Saxo-Thuringian Zone (Central European Variscides).A new project together with Thomas Heuse (Weimar) and Sören Meisel (Dresden, Jülich) on biostratigraphy (citinozoans, acritarchs), sequence stratigraphy and geochemistry will start in april this year. In co-operation with Olda Fatka (Praha), Petr Kraft (Praha), Jaroslav Marek (Praha) and Kerstin Drost (Freiberg Dresden) a project concerning the sedimentology, sequence stratigraphy, biostratigraphy and geochemistry of the Kambro-Ordovician of the Barrandian will start in Autumn this year. Both projects on this peri-Gondwanan areas will enable a comparison between Saxo-Thuringia and the Barrandian (Perunica). During the last years a lot of single zircon datings within the Cambro-Ordovician sections of Saxo-Thuringia were carried out during a number of projects with the colleagues of the isotopic laboratory of the Mining Academy of Freiberg (Michael Gehmlich, Marion Tichomirowa).

LÖFGREN, ANITA (Sweden). I continue working on conodont biostratigraphy in the upper Arenig and lower Llanvirn in Sweden, and also continue co –operation with Viive Viira on the Mäekalda section, north Estonia. My taxonomic work is currently focused on *Drepanoistodus? venustus*, on continued morphometric studies together with Tatiana Tolmacheva, and on platform conodonts in cooperation with Zhang Jianhua.

MCCRACKEN, SANDY (Canada). I've just submitted a small paper with co-authors Derek Armstrong (Ontario Geological Survey) and Tom Bolton on Ordovician-Devonian conodonts. These were found in xenoliths from kimberlite pipes in Ontario and Quebec. A multiauthored GSC Bulletin on Baffin Island paleontology and geology is in the typesetting stage. I continue to do service work on Ordovician, Silurian and Devonian conodonts from Canada.

MALETZ, JÖRG (Germany). I am working now mainly of Silurian (Llandovery) graptolites from Germany and Sweden, but I am still involved in work on Ordovician faunas. I am highly interested in Darriwilian graptolite faunas from eastern North America (Quebec, Newfoundland). A paper on the biostratigraphy of chitinozoans, conodonts and graptolites in the Mainland section (Port-au-Port peninsula is in preparation with Albani, Bagnoli & Stouge. Further work on Ordovician graptolite faunas from Germany and Bolivia (with Sven Egenhoff, B.-D. Erdtmann) is in progress, including a revision of the Hundt collection at Bergakademie Freiberg, Sachsen.

MÁNGANO, MARÍA GABRIELA (Argentina). I am working on Ordovician trace fossils from tide- and wave-dominated successions of northwest Argentina. I am particularly interested in tidal-flat ichnofaunas through time. At this point I´m analysing Cambrian and Ordovician tidal flat trace fossils from an evolutionary paleoecology perspective. I´m working particularly on trilobite biogenic structures, and trying to test the Cruziana stratigraphy paradigm. Together with Radek Mikulas I am studying predation traces from the Kosov Formation in the Czech Republic.

MÄNNIK, PEEP (Estonia). Work continues on the evolution, ecology and taxonomy of Ordovician and Silurian conodonts from Baltic, Arctic regions and Siberia, and on conodont-based high-resolution stratigraphy. Joint studies of the distribution of conodonts, graptolites (with Dr. D. Loydell from Portsmouth, U.K.) and chitinozoans (with Dr. V. Nestor from Tallinn, Estonia) are going on. A joint project with James E. Barrick (Texas Tech University) "Evaluation of proposed Silurian global oceanic episodes and events using conodonts" has been started.

MAREK, JAROSLAV (Czech Republic). Currently I am studying new material of Lower/Middle Ordovician cephalopods from Bolivia collected by students of prof. Bernd-D. Erdtmann (Berlin). The material consist of Endoceras, Bathmoceras, Bactroceras and other not yet determined annulated ellesmerocerids.

MEIDLA, TÕNU (Estonia). I am continuing studies on the Ordovician of Baltoscandia and on taxonomy and distribution of the Ordovician ostracods. Active projects deal with the ostracod diversity changes, latest Ordovician event (together with J. Marshall, P. Brenchley, L. Hints, T. Martma, J. Nõlvak), early Late Ordovician oceanographic changes and stratigraphy (together with L. Ainsaar, T. Martma) and several aspects of the Billingenian - Volkhovian interval (together with L. Ainsaar, A. Dronov, E. Egerquist, L. Holmer, O. Tinn, T. Tolmachova).

MEISEL, SÖREN (Germany). My current field of work is the high-resolution stratigraphy of the Ashgillian sedimentites of Saxo-Thuringia, that represents a separating crustal fragment in front of northern Gondwana at the Ordovician-Silurian transition. The sedimentary succession encompasses marine fan delta deposits (lower part) as well as pro-glacial marine diamictites (upper part). For investigations I use a combination of different techniques of microscopic analyses and statistical evaluation of drilling cores and / or sampels of “high quality”- outcrops. For the lower Ashgillian deposits a sequence stratigraphic model is to be realized by computer simulation. In the spring of this year I will start micropalaeontological datings to improve the biostratigraphy of the Saxo-Thuringian palaeozoic.

MERGL, MICHAL (Czech Republic). I prepare monograph of lingulate brachiopods from Tremadoc, Arenig, Llanvirn and Dobrotiva beds from Barrandian. It will be published in 2001 or beginning of 2002. Last year I spent much time with study of Silurian and Devonian lingulate brachiopods of Barrandian while study of Ordovician faunas was restricted.

MITCHELL, CHARLES E. (U.S.A.). I am involved in many projects (too many, really) these days. Most have to do with either the geological evolution of the Taconic foreland basin in the Appalachian orogenic belt, or graptolite biostratigraphy and evolution. Of the things most relevant to Ordovician issues are these: Together with students Mike Joy and Todd Marsh, Dr. Bob Jacobi (here at SUNY- Buffalo); Dr. John Delano and student Soumava Adhya (at SUNY Albany); and Dr. Stig Bergström (Ohio State University), I am trying (still) to sort out the stratigraphic and depositional history of the Upper Ordovician rocks deposited along the actively subsiding western margin of the Taconic foreland basin. We are looking at the interaction of sedimentological, structural, and eustatic controls on basin fill by employing detailed studies of the sediment deposition, and slump-related deformation within a precise temporal framework constructed by graphic correlation (time information provided by graptolites, conodonts, and geochemically fingerprinted volcanic ash horizons). Mike and I have recently submitted a paper outlining the contribution of local tectonic events to stratigraphic sequence development in the region and presented several abstracts at local and national GSA meetings. Two more presentations are coming up this spring to be presented by Todd and Soumava. Additional papers (at least three!) are in the works also.

I have taken on the job of coordinating author (i.e., chief scientific editor and writer of content) for a revised version of *The Treatise on Invertebrate Paleontology, Volume V: Graptolithina*. The assistant coordinating author is Dr. Michael J. Melchin, of the Department of Geology, St. Xavier University, Antigonish, Nova Scotia. The series is published by GSA and the Paleontological Institute, University of Kansas, with a volume dedicated to each of the major invertebrate groups. These books summarize the state of the art regarding the paleobiology, distribution in time and space, and systematics of each group, and are widely used internationally as the standard reference works for research and training of research students. Mike and I have assembled an international team of graptolite specialists and we will soon begin putting the book together. It is a five year project and should (I hope) involve some sponsored research (via the usual channels at NSF and as international collaborative projects funded in part in other countries).

I am working with Chen Xu, Zhang Yuan-dong, and Rong Jia-yu, among others, of the Nanjing Institute of Geology and Paleontology, Nanjing, P. R. China on the graptolite biostratigraphy and mass extinction in during the latest Ordovician. We are studying the patterns of species death an recovery in the central Yangtze Platform region of China and the relationships between patterns there and in other parts of the world. We have recently published two extended abstracts on this material at the 8th International Symposium on the Ordovician System that took place last summer in Prague, Czech Republic, and a full paper will be submitted any day now…. A paper on slightly older graptolites from Tarim (near the Gobi Desert in NW China) will appear in the Journal of Paleontology in March, 2000.

With Edsel D. Brussa (Faculty of Natural Sciences, University of La Pampa, Santa Rosa, Argentina) and Ricardo Astini (Laboratory of Stratigraphy and Historical Geology, National University of Córdoba, Córdoba Argentina), I am working on the biogeography and geological history of the Precordilleran Terrane (PT) of western Argentina. Our studies of the age and biological affinities of the Middle Ordovician fossils and their enclosing sediments are aimed at testing alternative models of PT history. Once again, we have recently published an extended abstract on this material at the 8th International Symposium on the Ordovician System and should produce a more detailed account one of these days soon.

Stig M. Bergström (Ohio State University), Greg Schumacher, Lawrence Wickstrom (both of the Ohio Geological Survey), I are finishing up a manuscript on the stratigraphic and tectonic evolution of the Sebree Trough. This feature is a more or less linear, relatively deep water trough that underwent differential subsidence within the North American midcontinent during the Vermontian phase of the Taconic Orogeny. Using a temporal and stratigraphic framework constructed from our biostratigraphic and lithostratigraphic work in the area (together with Walt Sweet's graphic correlation results -- Thanks Walt!), we are attempting to understand the temporal and spatial pattern of subsidence and how subsidence interacted with other events in the interval to produce the stratigraphic sequences recognized in the region. We also hope this will provide some unique insights into the response of portions of the continent well outside the classic orogenic belt to tectonic (collisional) events at the continental margin.

I am also supervising two students (Kin Keon-ho and Robert Haney) who are working on morphometric studies of *Triarthrus becki* and *Sowerbyella curdsvillensis* (respectively). Both are interested in patterns of stratophenetic change as well as geographic patterns of shape and size variation in late Middle Ordovician rocks from localities in Quebec, New York, Pennsylvania, Virginian, and Ohio/Kentucky. A third student (Brian Gates) is working on temporal and geographic patterns of graptolite faunal composition and diversity in the Utica Shale in New York State.

MILLER, JAMES F. (U.S.A.). I am working on several projects related to the Cambrian-Ordovician boundary interval. In the Ibex area of Utah I continue to work on conodonts from many sections, but especially from the Lawson Cove and Lava Dam North sections, together with Ray Ethington. I am working with Jim Loch on the trilobite biostratigraphy, with Kevin Evans on the sequence stratigraphy, and with Rob Ripperdan on the carbon-issotope stratigraphy. Leonid Popov and Lars Holmer and I recently submitted a manuscript describing the phosphatic brachiopods from Lawson Cove based on material recovered from my conodont samples. With Mike Bassett, we will make detailed collections from this section this summer. Bill Berry and I will make additional graptolite collections from Lava Dam North section this summer. Bill has identified *Anisograptus matanensis* that I collected from the *Iapetognathus* Zone at Lava Dam North last summer, within the House Limestone. These are the first identifiable graptolites from this low in the Ibex sections. I continue to work on Cambrian-Ordovician conodonts from cratonic mixed carbonate-siliciclastic facies in western Colorado with Paul Myrow, John Taylor, and Ray Ethington. Similar work is in progress from dominantly siliciclastic facies in cratonic areas in Iowa, Minnesota, Wisconsin, and Michigan. Few conodonts have been recovered from such lithologies of this age, so the results are quite interesting. In general, we are able to document large

hiatuses across the Cambrian-Ordovician boundary; these were suspected to exist in the past, but now we have the data to document their presence and magnitude.

NOLVAK, JAAK (Estonia). I am actively working on Ordovician chitinozoans and biostratigraphy from the Baltoscandian sections with my Estonian colleagues, focusing on the Ordovician and Silurian boundary beds. Our cooperation with Yngve Grahn regarding Ordovician chitinozoan taxonomy and biostratigraphy continues, also the study of two polish sections in co-operation with Zdzislaw Modlinski.

NOWLAN, GODFREY S. (Canada). I am currently working on: 1, Cambrian and Early Ordovician conodonts from the subsurface of the Western Canada Sediementary Basin and Williston Basin; 2, As Secretay of the International Working Group on the Cambrian - Ordovician boundary, completion of the necessary reports for the International Commission on Startigraphy and the International Union of Geological Sciences (with Roger Cooper); 3, Late Ordovician and Silurian stratigraphy and biostratigraphy of the Williston and Hudson Bay basins (with F. Haidl, G. Young, R. Elias and J. Jin); 4, Lower Paleozoic conodonts from the Appalchian region of Canada; 5, Ordovician and Silurian conodont biostratigraphy in support of major project on eastern Ellesmere Island, Canadian Arctic Islands; 6, Cambrian and Ordovician biostratigraphy of the Laurentian margin in support of a major project in Québec, Canada; 7, Recently completed a manuscript with Brian Norford and Denis Jackson on the Ordovician graptolite and conodont assemblages from the Glenogle Formation, British Columbia, Canada.

ORTEGA, GLADYS (Argentina). I am studying the graptolite faunas from the Cambrian-Ordovician boundary and the early Arenigian proceeding from different localities of Eastern Cordillera and Famatina System, Argentina. I also continue working with graptolites from the Gualcamayo, Los Azules, Las Plantas and Trapiche formations (Arenigian-Ashgillian) in the Precordillera, and the early Silurian faunas from the Lipeón Formation in the Sierras Subandinas of North-western Argentina.

OWEN, ALAN (United Kingdom) is making progress with the database on biodiversity change in Ordovician faunas of the British Isles (with Tim McCormick); some of the initial results being presented at the Prague Ordovician meeting. Work with Howard Armstrong on Ordovician chert geochemistry and on the provenance of fossiliferous limestone clasts is now largely published or in press and will result in the development of a new model for the plate tectonic evolution of British Caledonide terranes. A paper on the Caradoc trilobite faunas of the Duncannon terrane in Ireland is now in press and work continues with Mike Romano on trilobites from the Iapetus suture zone in eastern Ireland.

PARIS, FLORENTIN (France) I am involved in the activities of IGCP n° 410 "The Great Ordovician Biodiversification Event", both as one of the co leaders of the project and also as the co-ordinator of the Europe-Africa Regional Team and of the Chitinozoa Clade Team (see annual report of IGCP n° 410). I am responsible of a "CRISEVOLE" project (French program on biodiversity on the "The late Ordovician glaciation crisis and patterns of post glacial faunal recovery in northern Gondwana regions". I supervise the researchs of A. Bourahrouh (Rennes University) who is preparing a thesis on the behaviour of northern Gondwana palynomorphs with regard to the late Ordovician glaciation. I prepared a database specifically for chitinozoan workers, on the chitinozoans species (taxonomy, biostratigraphic and geographic distribution.. of type material). This database will be soon accessible via Internet.

PARNASTE, HELJE (Estonia). I am continuing work on Ordovician cheirurid trilobites of the Baltoscandian Paleobasin at the Institute of Geology of Tallinn Technical University, and composing the computerized database of trilobites housed at the institute. Also I'm working on Ph.D. thesis about taxonomy and biozonation of the Arenigian trilobites of northern East Baltic at the University of Tartu.

PERALTA, SILVIO H. (Argentina). I'm working on various aspects of the Ordovician marine sequences of the Cuyo Precordillera, Western Argentina, mainly related to biostratigraphic, paleoenvironmental, and also, local, regional and global correlation. I'm engaged in the study of the graptolites of the *N. gracilis* Zone from the Los Azules Formation, at the cerro La Chilca section, and the Las Aguaditas Formation, at the Las Chacritas section (La Trampa range), in San Juan Province. Likewise, I'm carring out a strong revision of the Caradocian graptolites faunas of the La Cantera Formation, in the Don Braulio Creek, at the Eastern flank of the Villicum range.
Moreover, I'm working on early Ordovician carbonate and mixed carbonate-siliciclastic sequences of the Gualcamayo Formation, at the Villicum range, and its correlatives, which bear graptolite and/or conodont faunas, associated with trilobites, brachipods, sponges, bryozoans, and palynomorphs. In this case, the conodont study is carried out by Susana Heredia (Comahue University, Neuquen Province), microfacies by Matilde

Beresi (CONICET - CRICYT, Mendoza Province), and palynomorphs (acritarchs and chitinozoan) by Elba Diana Pöthe de Baldis (Institute of Geology - San Juan University).
Likewise, we are carrying out, together with my colleagues of the Stratigraphy "task force" of the Institute of Geology (INGEO), San Juan University, for three years (2000-2002), a significant proyect, entitled : Stratigraphy and structure of the Ordovician and Silurian from La Deheza creek, Central Precordillera of San Juan, Argentina. This project deals mainly with stratigraphic, biostratigraphic, sedimentologic and structural features of the upper limestones of the San Juan Formation (Arenigian), and La Chilca Formation (late Asghillian to Wenlockian) and Los Espejos Formation (Ludlowian to Pridolian). In this area, my colleague Estela Pereyra, is working on her Ph.D in close relation with this Project.
From August to October 1999 I´ve been working with Dr. Stanley C. Finney (Stan) on graptolites of the Upper Ordovician in the Department of Geology, California State University, Long Beach. In this productive visits, I got a solid experience on the knowledge of the graptolites faunas from the Vinini Formation and correlatives in the Great Basin. We have published a paper in Spanish (Finney and Peralta, 1999), an abstract for the 31 International Geological Congress to be held in Rio de Janeiro, Brazil, and other paper on graptolites from the *Didymograptus protobifidus* Zone is in progress.

PERCIVAL, IAN (Australia) has had considerable success looking for conodonts in thin sections of cherts during much of the past year; these cherts of Darriwilian to Late Ordovician age are basinal equivalents of shallow water island-arc associated limestones found in central New South Wales. I attended the Ordovician Symposium in Prague, participating in pre- and post-conference field trips and presenting two papers. More recently I have been involved in organisation of the Palaeontology Down-Under conference, to be held in Orange, N.S.W. in July 2000. There will be a significant emphasis on Ordovician palaeontology and biostratigraphy at this conference, particularly with regard to a special symposium honouring Barry Webby's contribution to Ordovician studies, and a field trip specifically for IGCP 410 researchers (see separate notice in this issue of Ordovician News). Work in progress, which I will be reporting on at this conference includes (a) study of Early Ordovician (Bendigonian) conodonts from New South Wales [with Yogyi Zhen and Barry Webby]; and (b) review of Bolindian (Late Ordovician) biostratigraphy of New South Wales [with John Pickett and Lawrence Sherwin].

PRATT, BRIAN R. (Canada). I am currently working on a variety of Ordovician projects. I am finishing up a description of unique, microbial-dominated patch reefs in the Upper Ordovician subsurface of the Williston Basin. I am also working up a taxonomic description of Lower Ordovician corals belonging to Lichenaria from the St. George Group of western Newfoundland. My work on Ordovician trilobite taxonomy and biostratigraphy is concentrated on the Lower Ordovician Broken Skull Formation and correlative part of the Rabbitkettle Formation of the southern Mackenzie Mountains, northwestern Canada. Continued investigations of aspects of the sedimentology of Ordovician rocks contributed to my new theory for the formation of syneresis cracks which was published recently.

POPOV, LEONID (United Kingdom). Currently I am working on a number of projects related to various aspects of the Ordovician brachiopod taxonomy, palaeogeography, biofacies and biostratigraphy of Baltoscandia, Kazakhstan and Iran. A comprehensive revision of the Cambrian and earliest Ordovician brachiopods of Malyi Karatau Range and adjacent regions of south-central Kazakhstan and Kyrgyzstan was completed last year in co-operation together with Lars Holmer, Michael Bassett and Svetlana Koneva. It is submitted now to "Special Papers in Palaeontology".

PRIEWALDER, HELGA (Austria). I am working on Hirnantian chitinozoans from the Carnic Alps, Austria.

PYLE, LEANNE (Canada). I am currently working on my Ph. D. thesis entitled "Upper Cambrian to Lower Silurian stratigraphy and conodont biostratigraphy of platform to basin facies, northeastern British Columbia".

VON RAUMER, JUERGEN F. (Swiss). I am working on coordination of mostly metamorphic, pre-Variscan basement areas in Europe - the Alps included, and in this work comparision of granitoid magmatic rocks is included. Of main interest is also the significance of Ordovician orogenic event and its meaning. Publications on way.

REPETSKI, JOHN (U.S.A.). I am still working chiefly on biostratigraphy, CAI, biogeography, and systematics of Ordovician and Cambrian conodont faunas, with attention to faunas of other ages and to some phosphatic problematica when those are encountered. Most of my projects are related to energy, mineral deposits, and geologic mapping. One of the main projects in the Midcontinent, USA, where, as part of providing biostratigraphic support for a mapping and geohydrologic program in southern Missouri, Ray

Ethington, Jim Loch and I are generating a better biostratigraphic framework for the Late Cambrian through Ibexian interval with conodonts and trilobites. These efforts also are helping to clarify the context of the Gasconadian and Jeffersonian regional Stages. My other focus currently is in the central Appalachians, in 1.) a multidisciplinary project to study Cambrian Ordovician hydrocarbon systems; 2.) continuing work (with John Taylor and Dave Brezinski) to study the Late Cambrian through Ibexian from shelf to slope across northern Virginia-western Maryland-southern Pennsylvania; and 3) work on the Hamburg klippe and related terranes in eastern Pennsylvania (with Bob Ganis and Henry Williams). Some other work is in the Great Basin, Alaska, Mexico, and elsewhere, with various colleagues. New projects include using conodonts to help examine the "life cycle" of MVT deposits, many of which are hosted in Ordovician carbonate rocks.

ROBARDET, MICHEL (France). During 1999, I have been working mainly on the Silurian in NW France (Armorican Massif), NE Spain (Catalonian Coastal Ranges) and Portugal. This was done in collaboration with J.M. Piçarra (Beja, Portugal) and J.C. Gutiérrez Marco (Madrid, Spain). These studies include the Ordovician-Silurian transition. Concerning the Ordovician System itself, I have been co-author of: - a paper(with G. Sarmiento and J.C. Gutiérrez-Marco) on the Upper Ordovician and conodonts in NW Spain, a region where there are serious stratigraphical problems, as the Upper Ordovician successions differ, depending of the structural unit considered. - a global review of the Ordovician sedimentary rocks of France, with oral presentation in Prague during the 8th International Symposium on the Ordovician System.

ROHR, DAVID M. (U.S.A.). Presently I am working with W. D. Boyce and I. Knight of the Newfoundland Geological Survey on Lower Ordovician gastropods of western Newfoundland.

RUBINSTEIN, CLAUDIA VIVIANA (Argentina). I´m actively working on palynomorphs (acritarchs and chitinozoans) of lower Ordovician rocks in northwestern Argentina, especially in the Eastern Cordillera and Famatina. I'm collaborating with the "Acritarch Clade Group IGCP 410 (Great Ordovician Biodiversification Event)"at the compilation of a database for the South American acritarchs.

SANSOM, IVAN J. (United Kingdom). Having recently been appointed as a lecturer here in the department in Birmingham, I'm trying to find the time to continue to study Lower Palaeozoic vertebrate faunas. The main areas of interest include Middle Ordovician conodonts and fishes from North America (with Paul Smith and others), Cambrian and Lower Ordovician fish from Laurentia and the early development of gnathostomes. There is a fairly lengthy backlog of papers due to appear in press over the next year or so.

SARMIENTO, GRACIELA N. (Spain). I´m actively working on Ordovician conodonts and other phosphatic microfossils from the Iberian Peninsula and Maroc.

SCHOENIAN, FRANK (Germany). At the moment I am finishing my thesis on facies analysis of the glacial Cancaniri Formation at a locality in Southern Bolivia (Sella near Tarija). A summary of the results was already published (Schoenian et al. 1999). I am preparing a detailed paper with the focus on sedimentological methology and facies interpretation of this diamictite succession and another one on the provenance of these sediments for publication in this or the next year. Complementary paleontological field data on Early Arenigian cephalopodes and Arenigian pelecypodes of this locality will be co-authored with Jaroslav Marek and Claude Babin.

SERPAGLI, ENRICO (Italy) together with other Silurian projects and the final editing of the ECOS VII Conodont Symposium Volume, I was also working on the biostratigraphy of Late Ordovician conodonts, mostly from Sardinia (a report was published with A. Ferretti) and the Italian Carnic Alps. A study with W. Hammann on the occurrence and special paleoecologic and paleobiogeographic significance of *Cyclocrinites* and related algae from Caradoc sediments of southern Sardinia (Italy) is in progress.

SERVAIS, THOMAS (France). I am continuing work on Ordovician acritarchs and related forms from northern Gondwana and Avalonia, partly in collaboration with Joakim Samuelsson (Ghent), Rainer Brocke (Frankfurt), Olda Fatka (Prague) and Michael Montenari (Freiberg i. Br.). I try to coordinate the work of the acritarch clade-group of the IGCP 410 project to establish a complete database of all acritarch taxa described in the Ordovician. This file will be compiled with numerous workers and it should be ready for the Riverside meeting in 2001. I am currently co editing an issue of "Palaeozoic Palynology" together with Florentin Paris (Rennes). This issue serves as the proceedings volume of the successful Prague symposium at the 8th ISOS and should be published in late 2000 as a special issue of the Review of Palaeobotany and Palynology.

SHERGOLD, JOHN (France). I am actively working on a monograph of Late Cambrian and earliest Ordovician

trilobites from the Bonaparte Basin in the NE of Western Australia. The material is not well preserved in quartz sandstone and glauconite, so is a considerable challenge. Additionally, a second MS is in preparation which documents the earliest Ordovician trilobites of the Datson Member of the Ninmaroo Formation in the Georgina Basin, western Queensland, Australia.

SLAVÍ_KOVÁ, JANA (Czech Republic). I´m working on my PhDr. thesis dealing the trilobite´s assemblages of the _árka Formation (Llanvirnian, Czech Republic). I study their systematics, palaeoecology, taphonomy and stratigraphy of the Llanvirnian age. In cooperation with Dr. R. Mikulá_ I prepare the study about the association of trilobites and minute ovoid pellets in the fill of an ichnofossil (Ordovician, Llanvirnian, Czech Republic).

SMITH, PAUL (United Kingdom). I am currently working on a variety of Ordovician projects, including: a) The Ordovician diversification of vertebrates, including documentation of microvertebrate faunas in the Harding Sandstone, Colorado, and in Wyoming (with Ivan Sansom). b) Ordovician development of the Laurentian passive margin in Scotland, Greenland. c) The affinity and biogeography of *Anatolepis* (with Richard Fortey and Ivan Sansom).

STEEMANS, PHILIPPE (Belgium). I´m currently working on trilete spores and cryptospores from the Ordovician to the Lower Devonian. I'm working on the evolution of the biodiversity of these palynomorphs and on the process of the terrestrialization. I'm studying samples from Saudi Arabia, Libya, Belgium, Gotland, Brazil, Argentina, Urugay _ I'm collaborating with different seachers from these countries, like: S. Al-Hajri, A. Le H,riss,, C. Rubinstein, C.H. Wellman, K. Higgs, B. Owens, E. Pereira, J.M. Melo

STOUGE, SVEND (Denmark). I am actively working on several aspects of the Ordovician Carbonate sequence of the Easteuropean Platform.The work is done in cooperation with several institutions in Northern Europe.The project is financed by the Carlsberg Scientific Foundation. I am also starting on a new project in collaboration with the Geological Museum and Geological Institute - both of Copenhagen on the central Eastgreenland Cambro Ordovician carbonate sequence. This work is financed by the Danish Research Counsil.

SWEET, WALTER C. (U.S.A.). January-June, 2000: 8032 N. Casas Place, Tucson, AZ 85742 USA. June-January, 2000: Dept. Geol. Sci., OSU, 155 So. Oval Mall, Columbus, OH 43210 USA. In press (Journal of Paleontology) I have a report on conodonts and biostratigraphy of uppermost Ordovician rocks in central Nevada, USA. Conodonts occur with zonally significant graptolites and aid in relating graptolite zonation to Midcontinent conodont zonation. In preparation (with Ray Ethington and Anita Harris) a report establishing a conodont-based standard reference section in central Nevada for the early mid-Ordovician Whiterockian Series. Report is also being prepared for Journal of Paleontology, but will not be submitted before June, 2000. Mail will reach me promptly if sent to either sweet.2@osu.edu or sweet@azstarnet.com.

SZANIAWSKI, HUBERT (Poland). I´m actively working on paleobiological problems of conodonts based on Cambrian and Lower Ordovician material.

TINN, OIVE (Estonia). I´m continuing to work on lower Middle Ordovician ostracodes (with Tõnu Meidla) and with detailed stratigraphy and sea-level history of Arenigian in Baltoscandia (with Tõnu Meidla, Andrei Dronov and Leho Ainsaar).

TORO, BLANCA (Argentina). I am actively working on taxonomy, biostratigraphy and paleobiogeography of Ordovician graptolites. I am continuing to study graptolite fauna of the Argentine Cordillera Oriental, and integrating data with Dr. Claudia Rubinstein, in the context of the Great Ordovician Biodiversification event (GOBE, IGCP project 410). A review of acritarch biostratigraphy in the Arenig of the Eastern Cordillera and calibration with the graptolite zonation, will be published in Contributions to Geology and Palaeontology of Gondwana (honouring Prof. Dr. Helmut Wopfner), Kölner Forum für Geology und Paläontologie. I am also working with Dr Edsel Brussa on the review of the graptolites from Mendoza province (South of Argentine Precordillera).

TORTELLO, M. FRANCO (Argentina). I continue my studies on trilobites of the Cambrian-Ordovician transition in northwestern Argentina. Other projects include biostratigraphic implications of Tremadoc faunas of Lampazar, Cardonal and Saladillo formations in the Eastern Cordillera.

VIIRA, VIIVE (Estonia) is still working on Tremadoc conodonts in the Cambrian-Ordovician boundary beds biostratigraphy project (leader Ivar Puura). Studies on conodonts of the Maekalda section in Estonia with Anita Lofgren continue.

VILLAS, ENRIQUE (Spain) goes on working on the Tremadoc brachiopods from the Cordillera Oriental

Argentina, within a 3 years wider project entitled 'Biodiversification processes in the Mediterranean Province across the Early Ordovician. Biostratigraphic and paleogeographic controls' in cooperation with Javier Alvaro, Thomas Servais and Emmanuelle Vennin. This team will also begin to study this year the Lower Ordovician of the Montaigne Noire (France). He is also actively working, besides Wolfgang Hammann and Zarela Herrera, on the inarticulate brachiopods and trilobites from the Arenig of the Iberian Chains (NE Spain).

WANG, XIAOFENG (China). I continue to lead an integrated study of Lower Paleozoic litho-, bio-, chrono-and sequence- stratigraphy in the Yangtze Gorges area. The aim of this project is to establish newstratotype sections instead of these well-known or original named sections of different periods, separately exposed in the both sides of the Yangtze River, which will be submerged soon by water with building of a high dam. The rest of team includes Xiaohong Chen (chitinozoan), Chuanshan Wang (graptolite), Weihong He (trilobite, brachiopod) and Zhihong Li (conodont). In addition, this research group has reworked on high resolution biostratigraphic and chemostratigraphic correlation and biodiversification event from Late Ordovician to Early Silurian sequences at WangJiawan and Goujiaya sections near Yichang.

WEBBY, BARRY (Australia) is continuing to work on a number of Ordovician projects with Yong Yi Zhen, Ian Percival and Pierre Kruse involving Ordovician conodonts from sequences in New South Wales, in particular from Cambro-Ordovician boundary and Early Ordovician successions. A long, review-type manuscript entitled "Ordovician reef development: from slime to coralline" is near completion. Another large joint review with co-authors Ian Percival, Greg Edgecombe, Fons VandenBerg, Roger Cooper, John Pickett, John Pojeta, Bob Nicoll, Geoff Playford, Theresa Winchester-Seeto, June Philips Ross, Gavin Yong and Yong Yi Zhen, entitled "Ordovician biogeography of Australasia", assembled for publication in 1998 after a conference in Wollongong, remains with editors while they decide what to do now that Oxford University Press has decided not to proceed with the volume. We all hope that publication will proceed this year. Other tasks include continuing to work actively with Florentin Paris and Mary Droser to achieve some good results for the IGCP project no. 410 (The Great Ordovician Biodiversification Event) - details of activities are reported elsewhere in this issue of the Ordovician News.

WEBER, BERND (Germany). I am actively working on trace fossil assemblages in Cambrian and Ordovician siliciclastic sediments in South America (S-Bolivia) and Antarctica (Shackleton Range, Coats Land). Further details on research activities are available via the following homepage: http://www.tu berlin.de/fb9/ palaeontologie/.

WICANDER, REED (U.S.A.). I am working on Ordovician acritarchs and am currently involved in describing the acritarch assemblage from the upper Ordovician Bill's Creek and Stonington formations from the upper peninsula of Michigan. This project is in collaboration with Dr. Geoffrey Playford, Department of Earth Sciences, The University of Queensland, Australia.

WILSON, MARK A. (U.S.A.). I continue to work on Ordovician trace fossils, particularly borings, hardgrounds, and bryozoans (with Paul Taylor of the Natural History Museum).

WILLIAMS, MARK (United Kingdom). Together with James Floyd, Giles Miller and David Siveter, I am actively working on the Ordovician ostracodes of Scotland as part of ongoing British Geological Survey mapping programmes. We are studying several faunas, many previously undocumented, and spanning the stratigraphical interval from the Arenig to the Ashgill. A number of papers are in press or in preparation, dealing with the biogeographical and biostratigraphical significance of the ostracodes.

YOCHELSON, ELLIS L. (U.S.A.). My prime activity during the last several years was to try to complete the story of the career of Walcott. Look for "Smithsonian Institution Secretary Charles Doollittle Walcott" during the spring of 2001. Although most of his activity in western Canada was concerned with Cambrian he did do some work on the Ordoviciian. In the field of science, I am still interested in what is and what is not a mollusk. I would appreciate any references to Ordovician (or Cambrian) fossils reported as members of the Class Scaphopoda.

YOUNG, GRAHAM (Canada). I am continuing to work on Early Paleozoic corals, paleoecology, and stratigraphy. An ongoing field study of the Hudson Bay Lowland of Canada, with Bob Elias (University of Manitoba), Ed Dobrzanski (Manitoba Museum), David Rudkin (Royal Ontario Museum), and Godfrey Nowlan (Geological Survey of Canada), examines paleoenvironmental events across the Ordovician-Silurian boundary. A project with Shaochun Xu (recent postdoctoral fellow) documents Late Ordovician coral-stromatoporoid and tetradiid stromatoporoid intergrowths from south China. Research with Steve

Kershaw (Brunel University) considers paleoenvironmental applications of growth banding in corals and stromatoporoids. I am also looking at the stratigraphic distribution of Ordovician and Silurian tabulate corals in North America.

ZHANG, JIANHUA (Canada). I am continuing work on Ordovician conodonts. Since October 1999, I work as a PDF at School of Earth and Ocean Sciences University of Victoria with Prof. Chris Barnes. Currently I am identifying Ordovician conodonts from Amadeus Basin in central Australia.

ZHIYI, ZHOU (China). I have been working on the Ordovician trilobite biofacies of the Yangtze Block with Zhiqiang Zhou and Wenwei Yuan since 1998. The project aims to analyse the temporal and spatial distributions of both benthic and pelagic trilobites in response to biofacies. So far, different trilobite associations in relation to on-shelf to off-shelf environment gradient have been discriminated along two profiles across respectively the southern and northern marginal areas of the Yangtze Block. According to the facies association of morphologically similar cyclopygid trilobites, a depth-induced ecological differentiation between those mesopelagic forms is revealed. I also continue to work on several interesting Ordovician trilobite faunas from western Yunnan, western Zhejiang and the Upper Yangtze area. However, work is going slowly because of financial trouble.

ZUYKOV, MICHAEL (Russia) is currently working on study of brachiopods and biostratigraphy of the Middle and Upper Ordovician of the East Baltic. The main goals of his studies in present are: 1) phylogeny and systematics of the Baltic Platystrophia, 2) Caradoc faunal assemblages and sedimentology (with O. Hints, S. Terentiev, M. Tugarova), for his Ph.D. thesis which will be completed in three years, 3) taxonomic position of enigmatic strophomenid Ukoa (in cooperation with L.E.Popov). Two papers on brachiopods are preparing for publication, one of them with L.Hints. Michael is also engaged as a Chairman of Student Paleontological Society (St. Petersburg, Russia). Last Year several meetings under name "Actual problems of paleontology and stratigraphy of Odrovician of NW Russia" were held and most important abstarcts were published in St.Petersburg University press. In the future SPS plans to organize international student paleontological conference.

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