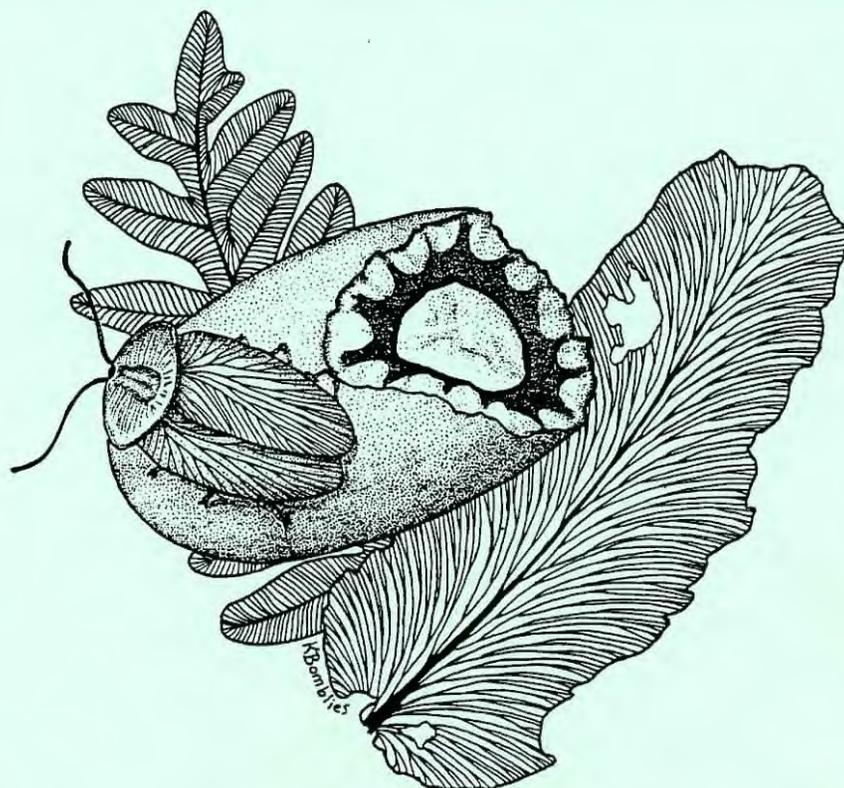


# NEWSLETTER ON CARBONIFEROUS STRATIGRAPHY

Volume 14

July 1996



SCCS

I.U.G.S. SUBCOMMISSION ON CARBONIFEROUS STRATIGRAPHY

## Table of Contents

CHAIRMANS' PAGE . . . . .	1
The Retiring Chairman's Message (Eva Paproth) . . . . .	1
The Incoming Chairman's Message (John Roberts) . . . . .	1
SCCS ANNUAL REPORT 1995 and BALANCE SHEET 1994-95 . . . . .	2
Secretary/Editor's Report (Brian Engel) . . . . .	3
Member Donations in 1995 - 96 . . . . .	3
Minutes of the SCCS Krakow Business Meeting - August 1995 . . . . .	4-6
WORKING / PROJECT GROUP REPORTS . . . . .	7
Carboniferous - Permian Boundary - <i>The Carboniferous now has a roof!</i> (Glenister) . . . . .	7
Project Group 4: Ammonoid zonation in Late Namurian successions (Kullmann & Nikolaeva) . . . . .	7
Working Group to define a GSSP close to the Moscovian/Kasimovian boundary (Villa) . . . . .	8
CONTRIBUTIONS BY MEMBERS . . . . .	9
Carboniferous of Central and Western Bohemia (Czech Republic) (Pešek) . . . . .	9
European Coal Conference 1995 - Report (Pešek) . . . . .	9
Palynology of the Itararé Subgroup (late Paleozoic) in northern Paraná Basin, Brazil (Rocha-Campos & Anelli) . . . . .	9
Life mode of some Brazilian late Paleozoic Anomalodesmata (Rocha-Campos & Anelli) . . . . .	10
Paleobiogeography and evolution of the late Paleozoic pelecypod faunas (Paraná Basin) from Brazil (Rocha-Campos & Anelli) . . . . .	10
A correlation chart for Carboniferous-Permian zones in Argentina, Uruguay and Bolivia (Archangelsky) . . . . .	10
The Mid Carboniferous Boundary & the beginning of the glacial age in Argentina (González) . . . . .	12
Carboniferous of East Yakutiya, Russia (Budnikov <i>et al.</i> ) . . . . .	12
Research on the Devonian and Carboniferous at Cologne University, Germany (Herbig) . . . . .	14
Mid Carboniferous Boundary position in Middle Siberia (Zorin & Peterson) . . . . .	15
Gondwana affinity microflora from Dingjiazhai Formation in Baoshan, West Yunnan, China (Gao Lianda) . . . . .	15
Australian Working Group on Carboniferous Fishes (Turner) . . . . .	16
Ichthyolith Issues (Turner) . . . . .	16
Major Carboniferous References - IGCP 328 and the International Microvertebrate Group . . . . .	17
ABSTRACTS OF PAPERS . . . . .	19
Fusulináceos carboníferos del este de Asturias (N de España) (Villa) . . . . .	19
The Carboniferous of Northwestern Serbia - Biostratigraphy and Geology (Stojanovic <i>et al.</i> ) . . . . .	19
Biostratigraphy and evolution of Upper Carboniferous and Lower Permian smaller foraminifers from the Barents Sea (offshore Arctic Norway) (Groves & Wahlman) . . . . .	19
Diagenetic alteration of calcitic fossil shells: Proton microprobe (PIXE) as a trace element tool (Bruckschen <i>et al.</i> ) . . . . .	19
<sup>87</sup> Sr/ <sup>86</sup> Sr isotopic evolution of Lower Carboniferous seawater: Dinantian of western Europe (Bruckschen <i>et al.</i> ) . . . . .	19
Early Carboniferous tetrapods in Australia (Thulborn <i>et al.</i> ) . . . . .	20
CONFERENCES AND NOTICES . . . . .	22
SCCS Field & General Meeting 1997- Southern New England Fold Belt, Australia . . . . .	20-21
PaleoForams '97 Conference, Western Washington University, Washington, USA . . . . .	22
PRELIMINARY QUESTIONNAIRE RESULTS (Engel) . . . . .	23-30
Appendix I: SCCS Membership mailing list 1996 . . . . .	Appendix 1-1 to 1-5
Appendix II: SCCS Voting Members list 1996-2000 . . . . .	Appendix 1-5
<hr/>	
Cover Illustration explanation . . . . .	2
Contributions to the Newsletter . . . . .	5
Carboniferous of the World, Volume III . . . . .	8
A Chronology of Carboniferous Congresses, Field Meetings and List of Office Bearers . . . . .	18
CONTINUED CORRESPONDING MEMBERSHIP OF SCCS - A REMINDER . . . . .	25

# Newsletter on Carboniferous Stratigraphy

IUGS SUBCOMMISSION ON CARBONIFEROUS STRATIGRAPHY / VOL. 14 - 1996

## *The Retiring Chairman's Message*

Stewardship of the Carboniferous System will soon pass to the new office bearers who, I am sure, are keen to keep the "train of progress" rolling along its new set of tracks - the recently revised Statutes and Guidelines of ICS. Given some solid work, courage, tenacious energy and - last but not least! - good luck, the new team will foster the main goal of SCCS: to produce reasonable decisions on internationally acceptable stratigraphic subdivision of the Carbon-

iferous System. I look forward in the near future to the outcome of the new Working Groups dealing with the revision of the base of the Viséan and Kasimovian Stages.

Members will agree that the progress of SCCS decisions is usually very slow. This is not a big disadvantage when it is acknowledged that a consensus, arrived at after all necessary deliberations, is preferable to hasty decisions which

may have to be reversed at a later date.

SCCS is fortunate to have a strong membership, keen on personal involvement with research. The bonds of friendship and co-operation between members have produced an organisation of which we can be justly proud. May it continue to prosper.

Good luck — "Glück auf!"

Eva Paproth

## *The Incoming Chairman's Message*

The main function of the SCCS has been, and will remain, the establishment of global chronostratigraphic boundaries for the Carboniferous System. These boundaries have traditionally been based upon biostratigraphic evidence. The time has come to diversify this approach utilising many of the more recently developed techniques, such as SHRIMP and TIMS dating of zircons,  $^{40}\text{Ar}$ - $^{39}\text{Ar}$  dating, stable isotope geochemistry and detailed magneto-stratigraphy, to supplement the biostratigraphic definitions. These physical techniques assume particular importance in parts of the record, such as the Upper Carboniferous, in which climate has exercised a demonstrable control on the global distribution of biota.

During the next four years we must make a concerted effort to enlist geochronologists, stable isotope geochemists and magnetostratigraphers into SCCS working groups and into research groups around the world concerned with Carboniferous topics.

Thanks to the great industry of Brian Engel over the past eight years, the *Carboniferous Newsletter* has become an extremely valuable means of communicating news items and details of new research initiatives and achievements by Carboniferous workers. The *Newsletter* is now read by geologists throughout South and North America, Japan, China, Oceania, South Africa, Europe, Russia and the new republics of Asia. We aim to continue publication of the *Newsletter* and ask that all Carboniferous workers keep on contributing news items, information on new meetings and the results of their research. The latter is most important as slow publication schedules in some refereed journals may delay the announcement of important results.

In order to achieve even faster and more regular communication between Carboniferous workers we will establish a comprehensive email address list as well as a home page on the Internet to provide information on forthcoming meetings of SCCS, the Carboniferous

Congress, meetings of significance to Carboniferous workers and Working Group activities. Significant new developments in Carboniferous stratigraphy could also be announced on the home page. At a time when science worldwide is under threat of severe cuts from government and other funding agencies, I believe that co-operation is the best means of not merely survival but advancement of our cause. For this reason, when our electronic network is established, I ask all of my colleagues to communicate regularly and work with one another to overcome their financial and other difficulties.

Finally, I wish to pay tribute to the leadership displayed by Dr Eva Paproth during her two terms as Chairman of the SCCS, to Dr Brian Engel for his great and long-standing efforts as Secretary/Vice Chairman and editor/compiler of the *Carboniferous Newsletter*, and to members of Project and Working Groups of the SCCS.

John Roberts

# SCCS ANNUAL REPORT 1995

## Membership

The Subcommittee has 22 Voting Members including the Executive Officers. Corresponding Membership was 258 plus 7 Libraries which receive this *Newsletter*.

## Bureau Officers 1996-2000

### Chairman:

Prof. John ROBERTS, School of Applied Geology, The University of New South Wales, Sydney NSW 2052, Australia.

### Vice Chairman:

Dr J. Thomas DUTRO Jr, 5173 Fulton St NW, Washington DC 20016 USA. (Election subject to ICS ratification).

### Secretary/Editor:

Dr Ian METCALFE, Department of Geology & Geophysics, University of New England, Armidale NSW, 2351 Australia.

## Voting Members

Dr Alexander Alekseev\*, Russia  
 Dr Paul Brenckle, USA  
 Dr Boris Chuvashov, Russia  
 Dr Geoffrey Clayton\*, Ireland  
 Dr Marine Durante, Russia  
 Dr Brian Engel, Australia  
 Dr Carlos Gonzalez, Argentina  
 Dr Philip Heckel\*, USA  
 Dr H. Richard Lane, USA  
 Dr Jean-Pierre Laveine, France  
 Dr Bernard Mamet, Canada  
 Dr Walter L. Manger, USA  
 Dr Ian Metcalfe\*, Australia  
 Dr Ouyang Shu\*, China  
 Dr Nick Riley\*, UK  
 Dr A.C.Rocha Campos, Brazil  
 Dr George Sevastopulo, Ireland  
 Dr Elisa Villa\*, Spain  
 Dr Robert H. Wagner, Spain  
 Dr C.F. Winkler Prins, Netherlands  
 (\* = Newly elected members)

A warm welcome is extended to the newly elected members. The Subcommittee also wishes to place on record its thanks to the following list of members who have decided to stand down from the voting panel. Their dedicated service over many years has maintained the Subcommittee as a viable organisation. A special vote of thanks goes to the two Past Chairmen, Dr Ramsbottom and Dr

Paproth, for their major contributions to the success of the organisation:

Dr Guo Honjun, China  
 Dr Hisayoshi Igo, Japan  
 Dr Robert Kosanke, USA  
 Dr Li Xingxu, China  
 Dr Eva Paproth, Germany  
 Dr W.H.C. Ramsbottom, UK  
 Dr Yang Shipu, China

## STATEMENT OF INCOME AND EXPENDITURE 1994-95

INCOME (Oct. '94 - Sept. '95)	A\$	US\$
	Definitive	Estimated
IUGS Grant for 1995	1,202.80	880.00
Donations from members	335.57	251.68
Bank interest	24.83	18.62
<b>TOTAL INCOME</b>	<b>1,563.20</b>	<b>1,150.30</b>
<b>EXPENDITURE</b>		
Newsletter 13 publication/postage	992.82	744.61
Bureau postage & stationery	281.43	211.08
Grants to SCCS XIII ICC-P members	275.00	206.25
Bank charges	6.82	5.11
<b>TOTAL EXPENDITURE</b>	<b>1,556.07</b>	<b>1,167.05</b>

**Explanatory Note:** Definitive income and expenditure are quoted in Australian Dollars. All income and expenditure have been converted at an exchange rate of A\$1.00 = US\$0.75

BALANCE SHEET (1994-95)	A\$	US\$
	Definitive	Estimated
Funds carried forward from 1994	25.05	18.52
Exchange rate gain (0.65 to 0.74 US)		22.36
PLUS Income 1995	1,563.20	1,150.30
LESS Expenditure 1995	(1,556.07)	(1,167.05)
<b>CREDIT balance forward to 1995-96</b>	<b>32.18</b>	<b>24.13</b>

## BUDGET REQUEST FOR 1996

	US\$
Newsletter 14 (prep./publ./post)	700.00
Other Bureau expenses	400.00
<b>PROJECTED EXPENDITURE</b>	<b>1,100.00</b>

The Subcommittee has been advised by ICS that it has been allocated US\$870.00 in IUGS funding for 1996.

## THE COVER ILLUSTRATION

The illustration is a reproduction of the logo of the 12th Midcontinent Paleobotanical Colloquium held in May 1995, in Philadelphia USA. The logo shows the foliage of the pteridosperms *Alethopteris* and *Neuropteris*, a pteridosperm seed which has been broken open, and a Carboniferous insect crawling over the seed.

The line diagram was kindly supplied by Dr Hermann W. Pfefferkorn, Department of Geology, University of Pennsylvania, 240 S. 33rd Street, Philadelphia, PA 19104-6316, USA.

# Secretary/Editor's Report

As the Subcommittee approaches its regular change of Office Bearers it seemed appropriate that I should include a brief statement detailing the "state of the nation".

SCCS enjoys the dedicated support of a very large group of industrious members. We have some 280 participants with whom regular contact is maintained. In addition, our publication goes to some fifteen other individuals or organisations.

Currently, the Subcommittee has completed its deliberations on the Mid Carboniferous Boundary and we await its final ratification by ICS/IUGS. In addition, we have two new Working Groups and two Project Groups which are active at present and we can expect that the results of at least some of these groups will be forthcoming in the not too distant future.

The main source of communication is of course the *Newsletter* which is an essential component of our continued collaboration. I would anticipate that members will continue to send many contributions to the new Secretary, Ian

Metcalf, so that he can provide a forum for informing all members of current research being undertaken. It is your medium for keeping your fellow members informed and the organisation will not flourish if you do not actively provide suitable contributions.

Communication rates have now reached a level which we have not previously enjoyed. In my first term of office, the executive, located on opposite sides of the World, communicated by airmail letters with a turnaround time of about four weeks between questions and answers. In the last few years, facsimile machines have reduced the response rate to about 24 hours or so. Now, with inexpensive computers and the Internet (e-mail and WWW), we have seen the shift to an even better level of contact for the majority of members. What an exciting vista this opens up! - can I recommend that you use this new media to its full capacity.

Financially, the Subcommittee is paying its way without major gain or loss due to the combined contributions of ICS/IUGS and those

members who have kindly elected to make donations. Without the latter, it would not be possible to publish the *Newsletter* and I wish to convey to our many donors, my sincere appreciation of the vote of confidence you have given to the retiring executive by your generous support. I hope that you will continue this generosity with the new executive.

Finally, my decision to decline the kind offer of John Roberts to continue as Secretary of SCCS was made with not a little difficulty, indeed regret. On the one hand, I value very highly the wide range of contacts that I have made with the membership of SCCS over the past decade and I will miss the friendly correspondence which is an essential part of the job. On the other hand, I felt that the Subcommittee needed the input of fresh ideas from a younger generation of Carboniferous specialists and so I have chosen to stand aside for this to happen. My interest in the Subcommittee is not diminished and I hope to continue as a Voting Member for one more term.

Brian Engel

## SCCS Member Donations in 1995 - 96

Publication of this *Newsletter* is made possible with generous donations received from the following members during 1995-96, combined with an IUGS subsidy of US\$870 in 1996 and additional support from the small group of members who provide internal postal charges for the *Newsletter* within their respective countries.

Prof. N.W. Archbold  
Dr P. Brenckle  
Dr J. Carter  
Dr D.R. Chesnut  
Dr C.J. Cleal  
Dr H.H. Damberger  
Dr W.R. Danner  
Dr J.T. Dutro Jr  
Dr R.M.C. Eagar  
Dr Masayuki Ehiro  
Dr K. Englund  
Dr F. Ettensohn  
Dr R.A. Gastaldo  
Prof. B.F. Glenister  
Dr Luc Hance  
Prof. H-G. Herbig

Dr Hisayoshi Igo  
Dr T.B.H. Jenkins  
Dr P.J. Jones  
Dr Toshio Koike  
Dr K. Krainer  
Dr J. Kullmann  
Dr M.J. Legrand  
Prof. B. Mamet  
Dr M. Menning  
Oviedo Spanish Group (x2)  
Dr M.F. Perret  
Prof. H. Pfefferkorn  
Dr S. Pinard  
Prof. G. Playford  
Prof. E. Poty  
Dr W.H.C. Ramsbottom

Prof. H.P. Schönlaub  
Dr C.H. Stevens  
Ms M. Stucke  
Dr J. Tazawa  
Dr R.R. West  
Dr G.P. Whalman  
Dr G.L. Wilde  
Dr Wu Wang-shi  
Dr J. Yanagida  
Anon.- Argentina (x1)  
Anon.- Australia (x2)  
Anon.- France (x1)  
Anon.- Germany (x5)  
Anon.- Japan (x1)  
Anon.- USA (x1)  
Anon.- UK (x1)

# Minutes of the SCCS Meeting, Krakow, 1995

## MINUTES OF THE SCCS GENERAL MEETING ON 31 AUGUST 1995

**Venue:** Academy of Physical Education, Kraków, Poland.

**Opening:** The meeting was opened at 9:00 a.m. by the Chairman, Dr Eva Paproth.

**Attendance** (members & visitors): F. Abdesselam-Rouighi, A.S. Alekseev, S. Archangelsky, P. Brenckle, G. Clayton, S. Dara, V.L. Davydov, T. Dutro, B.A. Engel, H. Forke, N. Gibshman, L. Hance, J. Kalvoda, H.R. Lane, J-P. Laveine, B. Mamet, W. Manger, T. Nemirovskaya, B. Owens, Eva Paproth (Chairman), N. Riley, J. Roberts, G.A. Rukina, L.C. Sánchez de Posada, G. Sevastopulo, E. Villa, R.H. Wagner.

### Report of the Chairman:

Dr Paproth referred briefly to her report in the last Newsletter (v. 13) which the membership had now received.

### Report of the Secretary:

The last *Newsletter* (vol.13) was posted in July 1995 and the contents thereof were not repeated at this meeting. Current membership consists of 22 Voting Members and 245 Corresponding Members and Libraries.

**Financial matters:** Most of our expenses are related to the production of the *Newsletter* which this year cost approximately US\$750 to produce and distribute. This is not the full extent of the cost as, in order to avoid the lengthy delay of several months incurred with surface postage from Australia, the *Newsletter* is sent by economy airmail in large bundles to about 12 members who in turn re-post them into their local mail systems. The cost of the latter is borne by several organisations and/or individuals

and I would like to place on record our indebtedness for that support.

**Financial statement:** The financial year commenced with a balance of US\$18.52 and finished with a carry over of US\$25.05. This near balanced position was made possible by an ICS grant of US\$880 and membership donations of US\$251.68. A detailed statement will be presented in *Newsletter* 14.

**Elections:** Relevant revised statutes of ICS setting out election procedures for Subcommissions were reprinted in the last *Newsletter*. In essence, each term of office extends from one IGC meeting to the next (approx. 4 years); Chairmen may hold the position for two terms (8 years max.) and Voting Members for their original plus two more terms (12 years max.). At the end of each term, one-third of the membership is required to retire which in our case calls for about 6-7 members to stand down at this time. In procedural terms, ICS elects each Chairman and Vice Chairman from a short list of one or two candidates nominated by the Subcommission. Voting members are elected by the Subcommission itself and are subject to ICS endorsement.

**Proposed Survey:** It is proposed that the membership be canvassed shortly with a survey which will seek details of current relevant activities. At present, stratigraphy is a discipline in apparent decline and it is essential that we address this issue and promote the contributions which are being made by our membership. Funding of Subcommission activities has declined as IUGS transfers its attention to the IGCP program rather than to ICS. One reason for this is that IGCP programs have a short term objective for their funding whereas the Subcommissions are an open ended operation with no deadlines for their activities. We need to change this approach if we expect the Subcommissions to survive in the user-pays environment in which we operate. I seek your

co-operation in this attempt to publicise our activities.

**Working Groups/Project Groups:** The Mid Carboniferous Boundary submission should be with ICS before the end of the year. Voting matters were completed in March and the submission document is now in final preparation. The Project Groups established in Provo in 1989 have essentially run their course and the decision will need to be taken at this meeting to establish short term Working Groups or to abandon the proposals which have not shown promise.

### Reports:

**1. Mid Carboniferous Boundary Working Group Report (H.R. Lane):** Dr Lane presented a final summary of the history of events leading up to the Arrow Canyon Section decision. The Chairman thanked Dr Lane and the members of the Working Group for their contribution and then discharged the Working Group. A vote of thanks was carried with acclamation.

### 2. Project Group Reports:

**Project Group 1 (P. Brenckle):** Dr Brenckle advised the meeting that this Project Group had been unable to find any sections which demonstrated potential for a boundary definition. He noted that most relevant sections in western North America and Europe have been investigated and there appears to be nothing suitable in those regions. There was a possibility that potential sections existed in middle Asia but for logistical and financial reasons it was not feasible to continue further investigations in that region nor to provide support for local investigators. He recommended that the group be discharged from further action at this time. The meeting endorsed the recommendation to discharge Project Group 1 at this time.

**Project Group 2 (G. Sevastopulo):** The leader stressed that the revision of boundaries must maintain a level of stability with pre-existing definitions which in this case is the long established Tournaisian-Viséan boundary with its formal stratotype in Belgium. It has been found that the current definition of this boundary is at best unsatisfactory and because of this has been widely used in very different senses throughout the World. In the summary presented by him at the Liège conference, opinion was sought on the desirability of moving the boundary substantially downwards to the base of the *Scaliognathus anchoralis* zone or upwards to the appearance of the early evolutionary sequence of primitive archaedisid foraminifera. Despite a small response, opinion seemed to prefer a downward movement. Since then, detailed work in the Belgian region has made it apparent that even in Belgium the current stratotype was an unfortunate choice particularly as most of the defining taxa are cryptogenic. Subsequently, Dr Luc Hance and others undertook work in China in an effort to correlate the Chinese sections with the traditional Tournaisian-Viséan Boundary. This work has revealed in China a sequence of foraminiferal evolutionary stages of great potential from which it may be possible to define

a stratotype and boundary which is situated close to the classical level.

At present, contributions on the subject are required to answer two major questions - (1) Is a revised boundary worth chasing? and (2) Which boundary would be the best to pursue?

This contribution was followed by a detailed presentation by **Dr Luc Hance** describing the work that he and his colleagues have undertaken both in Belgium and South China. He concluded that the search for a new type area in China was producing most promising results.

A motion was then put and carried unanimously that **"A Working Group be formed to establish a boundary close to the existing Tournaisian-Viséan boundary within the Lower Carboniferous."**

The Chairman of the Working Group, Prof. Sevastopulo, was invited to select the membership of the Working Group and to advise the executive of the names of the members.

**Project Group 3:** In the absence of a report dealing with this level, the Chairman proposed that the Project Group should be abandoned. Rescue came however with **Dr Nick Riley** and **Dr Bernard**

**Owens** (British Geological Survey) jointly volunteering from the floor to take over the chairmanship. It was agreed that the Project should therefore continue under their joint leadership with a preliminary report to be given at the next meeting of the Subcommittee in two years time.

**Project Group 4:** In the absence of Prof. Kullmann, Dr Paproth reported that **Dr Dieter Korn** has been working on productive ammonoid bearing sections in southern Portugal which still require two to three years of study. As yet, work has not extended down to the levels at which *Gastrioceras* could be expected to occur. In view of the potential of this region, it was agreed that the Project Group should continue its investigations.

**Project Group 5 (E. Villa):** Dr Elisa Villa made reference to her extensive report presented in *Newsletter 13* which gives full details of the activities of the Project Group. It was agreed by the meeting that this Group should now proceed to full Working Group status. Accordingly it was moved by T. DUTRO and H.R. LANE and unanimously agreed to by the meeting that:

**"A Working Group be formed to establish a GSSP close to the Moscovian/Kasimovian boundary"**.

## CONTRIBUTIONS TO THE NEWSLETTER

The Newsletter on Carboniferous Stratigraphy is published annually (in July) by SCCS. It is composed of written contributions from its members and provides a forum for short, relevant articles such as:

- \* reports on work in progress and/or reports on activities in your work place
- \* news items, conference notices, new publications, reviews, letters, comments
- \* graphics suitable for black and white publication.

Contributions for each issue should be timed to reach the Editor **before 31 May in the year of publication**. Material supplied well before this deadline would be appreciated. To facilitate setting up the Newsletter and to reduce typing errors, it would be of assistance if copy could be sent BOTH on paper and a computer disk. However, contributions without a disk are still acceptable.

The Newsletter is prepared using Microsoft Word on the Macintosh but contributions on most other word processing systems can be accommodated. Material should be forwarded on 3.5 inch disks in either Macintosh or IBM format. If you can supply a disk, you should observe the following requirements. Please include a printed copy and the name of the word processing package that you have used. Supply two copies of the file on disk. The first can be the normal output of your software which can include enhancements such as bolding and italics but NO indents or leading TABS please. Avoid any unusual formatting features of your package. The second copy of the file should be saved as a plain ASCII textfile (i.e. no enhancements). Please ensure that all typing is done with only ONE space after each full stop at the end of each sentence. Unless specifically requested, the disk will not be returned since the cost of return postage is generally far greater than the original value of the disk. Please follow up your message with an air mailed, formatted, paper copy so that your special formatting (e.g. italics) can be restored by the Editor.

AIR MAIL your contribution to the Editor:

Dr Ian Metcalfe, Department of Geology & Geophysics, University of New England, Armidale NSW 2351 Australia. (Tel: +61 67 732860; Fax: +61 67 733300)

Files can also be included in an E-mail message or attached as a Rich-Text-Format (RTF) file or MS Word document compressed with BinHex 4 on the Internet. The Editor's E-mail address is:

**s c c s @ u n e . e d u . a u**

Dr Villa was invited to chair the Working Group, to select the membership of the Working Group and to advise the executive of the names of the members.

**Other Working Group matters:** During the discussion, **Dr Brian Glenister** asked if members of the Subcommission were in agreement with the proposals of the Working Group on the Carboniferous - Permian Boundary presented elsewhere at the Congress. Informal acceptance of the progress to date was agreed to by the members present.

From the floor, Dr Lane raised the issue of the difficulty of correlating the Morrowan-Atokan, Bashkirian-Moscovian and early Westphalian sequences and proposed that a Project Group should be formed to investigate these issues. After some discussion, it was agreed that the formation of a Group could be pursued by the new executive with a view to its formation at the next Subcommission meeting in two years time.

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### Information items:

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The following items were drawn to the attention of the Subcommission membership:

1. **SEPM Research Group on Quantitative Stratigraphy (H.R. Lane):** Dr Lane gave a brief report on the formation of this group and its proposed program (see *Newsletter* 13).

2. **IGCP Project 343 - Carboniferous-Permian correlations between Continental and Marine Domains of the Greater Tethyan Area.** (Because of a Congress timetable clash, the Chairman read a short written report from the Project Leader detailing the progress made by this study.)

3. **IGC - ICS Workshop (J. Claoué-Long & L. Hance):** The Chairman advised that the ICS Workshop at the next IGC will contain eleven symposia topics of which two will deal with Carboniferous issues. The first will discuss the correlation of radiometric

and biostratigraphic data in the Carboniferous System and will be convened by **Jon Claoué-Long** (or his proxy). The second, convened by **Luc Hance** and colleagues, will discuss candidates for a boundary stratotype of the Viséan Stage with a view to demonstrating the methods and techniques by which internationally agreed boundaries are achieved.

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### Nomination of Office Bearers & Voting Membership:

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**Chairman:** Prof. John Roberts was nominated by the Chairman - in the absence of further nominations, the meeting unanimously endorsed the nomination.

**Vice Chairman:** No nominations were received.

**Secretary:** To be chosen by Chairman (no election required).

**Voting Membership:** Some provisional nominations were made from the floor of the meeting. Further nominations are to be sent to the Secretary not later than the middle of November 1995. At this stage it is not possible to finalise the nominations until the number of retiring members is known.

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### Field Meeting to southern China, November 1996:

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A field meeting of about 10 days will be arranged for a small group to visit the Lower Carboniferous sections in southern China in mid-November 1996. Interested members should contact **Dr Luc Hance** for further details as they are finalised. The purpose is to provide specialists with the opportunity to sample and study material from the sections.

Mention was also made at this time by **Dr T. Nemirovskaya** of other proposed excursions in 1996 to various parts of the former Soviet Union. Members were asked to contact her for further information.

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### Field and General Meeting 1997:

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The meeting accepted a proposal by **Prof. John Roberts** that the next Field and General Meeting be held in eastern Australia. The alternative suggestion by **Dr Richard Lane** of a visit to the Nevada region in USA was deferred in favour of the Australian proposal.

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### Other Business and Closure:

---

Dr Lane raised some organisational issues which the incoming executive were asked to consider.

The Chairman closed the meeting at 1:05 p.m.

Signed as a true record:

Eva Paproth  
Chairman

## **The Carboniferous now has a roof!**

**BRIAN F. GLENISTER**, Chair, Carboniferous/Permian Working Group; Department of Geology, University of Iowa, 136 Trowbridge Hall, Iowa City IA, 52242-1379, USA.

Interest in developing international consensus on formal definition of a base for the Permian System (and coincident top of the Carboniferous) was heightened by the International Congress on the Permian System of the World, Perm, Russia, August 5-10, 1991. The pre-session field excursion to classic sections in the Southern Urals of Russia and Kazakhstan was pivotal in refocusing attention on Aidaralash Creek, Aktyubinsk (currently Aqtöbe) region of northern Kazakhstan. This section was used by V.E. RUGHENCEV, almost one-half century earlier, to designate a lower boundary for the basal Permian Asselian Stage, primarily by reference to ammonoid cephalopod distributions.

## **A formal proposal of Aidaralash as GSSP for the base of the Permian**

Subsequent detailed field and laboratory analysis of the Aidaralash section, and comparison with contemporaneous sections in the Urals and elsewhere culminated in the formal proposal of Aidaralash as GSSP for the base of the Permian (DAVYDOV *et al.*, 1995, *Permian* 26, p. 1-9). The base was defined as the first occurrence of the "isolated-nodular" morphotype of the *Streptognathodus "waubaunsensis"* conodont morphocline, 27 m above the base of Bed 19. This level is a mere 26.8 m below the ammonoid boundary originally proposed by RUGHENCEV, and 6.3 m below the level favoured by many fusulinacean workers. Consequently, the three levels may be considered

synchronous for practical purposes.

Coincident with submission of the Aidaralash manuscript for publication, copies were distributed to voting members of the Carboniferous/Permian Boundary WG, who approved the GSSP (with one abstention) for consideration by the Subcommittee on Permian Stratigraphy. SPS Titular Members G. Cassinis (Italy), J.M. Dickins (Australia), B.F. Glenister (USA), C.B. Foster (Australia), Sheng Jin-zhang (China), M. Kato (Japan), G.V. Kotlyar (Russia), H. Kozur (Hungary), E.Ya. Leven (Russia), M. Menning (Germany), W.W. Nassichuk (Canada), C.A. Ross (USA), J. Utting (Canada), Jin Yu-gan (China), and B.R. Wardlaw (USA) voted in favour of the proposal. The remaining voting member B. Chuvashov (Russia) abstained. Upon this approval by the SPS, the proposal was approved subsequently by the Full Commission of the International Commission on Stratigraphy, and later by the International Union of Geological Sciences. Remaining is the formality of final ratification during the 1996 Beijing meeting of the International Geological Congress.

## **PROJECT GROUP 4: Ammonoid zonation in Late Namurian successions**

J. KULLMANN, Institut für Geologie und Paläontologie, Universität Tübingen, Germany and S.V. NIKOLAEVA, Paleontological Institute of the Russian Academy of Science in Moscow, Russia.

Ammonoid zonation of Late Carboniferous successions enable reliable international correlations between European, American and Uralian sections. In a number of publications, the stratigraphical range and the boundaries of the upper Namurian zones and their fossil content have been reviewed recently (KULLMANN &

NIKOLAEVA, 1995). To provide a general framework for the Carboniferous stratigraphy, we are presently engaged in an additional study focussing on the data of easily identifiable goniatite faunas of the early Upper Carboniferous zones and their global distribution.

The lower boundary of the Kinderscoutian Stage corresponds with the lower boundary of the *Reticuloceras inconstans* Zone and the *Reticuloceras (Phillipoceras) circumcumplicatile* Zone. A little below the first appearance of these true reticuloceratids a band with *Hodsonites magistrorum* and *Reticuloceras? compressum* has been recognised in Ireland, England and Germany. It is now regarded as the base of the Kinderscoutian. The correlation of the European zonation with the Uralian and Asian sections remains problematic; because of condensation of the sections, the precise position of the base of the *Reticuloceras-Bashkortoceras* Genus Zone is not yet clarified. In North America the equivalents of the basal Kinderscoutian zones are apparently missing.

The upper boundary of the *Reticuloceras* Zone in Europe and the *Reticuloceras-Bashkortoceras* Genus Zone corresponds with the lower boundary of the overlying *Gastrioceras* 1 Zone and the *Bilinguites-Cancelloceras* Genus Zone resp.; the position and correlation of these levels have been discussed in detail by KULLMANN & NIKOLAEVA (1995). The entry of the genus *Bilinguites* clearly marks the beginning of the next higher stratigraphic unit; it is readily recognised in most successions.

## **Recent publications:**

KORN, D. & KULLMANN, J. (1994): GONIAT Database System, version 2.51; Tübingen.

KULLMANN, J. & NIKOLAEVA, S. (1995): A Review of the Upper Namurian ammonoid biostratigraphy.- Newsletters on Stratigraphy 32: 117-136, 10 figs., Berlin, Stuttgart.

## **Working Group to define a GSSP close to the Moscovian/Kasimovian boundary** (formerly Project Group 5)

ELISA VILLA, Departamento de Geología, Universidad de Oviedo, 33005 Oviedo, Spain.

**T**hrough 1995, the SCCS Working Group on Project 5 has continued its activities focused on the search for a level of correlation in the upper part of the Carboniferous System. The main events can be summarised as follows:

**Meeting in Moscow** - Several members of the Group met in Moscow in June 1995. The meeting was organized by DR ALEKSANDR ALEKSEEV and other Russian members of the SCCS WG P5. It included several laboratory sessions at the State University of Moscow and the Geological Institut, as well as a field trip to the Domodedovo and Afanasievo sections. Most of the sessions were devoted to discussion among fusulinid and conodont specialists, who had the opportunity to compare materials from different areas of the world. The field excursions provided an examination of two sections of great interest for the stratigraphy of the Russian Carboniferous, especially for the study of the uppermost Moscovian and the Lower Kasimovian. A final meeting, with the participation of all the attendees, established the results obtained so far, and set the main goals to be achieved in the near future.

**Carboniferous Congress at Krakow** - During the sessions of the XIII Carboniferous Congress held in Krakow in August-September 1995, members of SCCS were presented with a detailed report comparing the paleontological and sedimentological characteristics of the Las Llacerias section (Cantabrian Mountains) and the Domodedovo section (Moscow Basin). The study and comparison of these two sections, which include Moscovian and Kasimovian strata, have allowed the tentative

use of some fusulinid and conodont evolutionary features as elements of correlation. A general meeting of the SCCS WG P5 took place during this Congress. Working Group members from America, Russia, Japan, Germany, Spain and Ukraine debated the problems involved in our task and planned future WG activities.

### **Field Trip to the Donbass Basin**

It was decided during the meeting at Krakow to organise a Field Trip to the Donbass Basin (Ukraine) in September 1996, which will also include laboratory sessions at Kiev. DR PETRO SHPAK, Director of the Institute of Geological Sciences of Kiev, has kindly offered the collaboration of that Institute for organising the meeting and the field trip. The latter will be guided by DR TAMARA NEMIROVSKAYA, DR ALEXSANDR Y. LUKIN and DR VLADISLAV I. POLETAEV. At this moment, more than 20 members of the Working Group have expressed their intention to attend.

**Membership changes** - During the meeting held at Krakow, the addition of the following new members of the Working Group was announced: DR HOLGER

FORKE (Friedrich-Alexander-Universität Erlangen-Nürnberg, Germany) and DR GREGORY WHALMAN (Amoco Production Company, Houston, USA). Dr FORKE is studying the fusulinid and conodont content of a section in the Carnic Alps, while Dr WAHLMAN will study fusulinids from Desmoinesian/Missourian strata of Western USA.

We are also glad to announce that DR DANIEL VACHARD (Université des Sciences et Technologies de Lille, France) has recently joined the Working Group. He expects to study the foraminifera and algae of some Desmoinesian/Missourian sections in Mexico and will co-ordinate studies of other fossil groups, such as conodonts (DR JEAN-MARIE DEGARDIN) and spores (DR ROBERT COQUEL).

DR A. DZHENCHURAEVA (from the KMEGEI, Bishkek, Kyrgystan), who has also recently joined the Working Group, has informed us that the sedimentologist DR ALEXSANDR GONCHAR (Tashkent, Uzbekistan) will collaborate with her in investigations related to those of the Working Group.

## **Carboniferous of the World Volume III**

At last, the third volume of the *Carboniferous of the World* is completed (apart from some technical details) and will be published later this year by the Instituto Tecnológico GeoMinero de España (ITGE, Madrid) and the Nationaal Natuurhistorisch Museum (NMM, Leiden).

It contains the following chapters:

- Preamble
- Dedications (to Olgerd Leonardovich Einor, Alexandrina Dmitrievna Grigorieva, Sergei Viktorovich Meyen & Maria Nikolaevna Solovieva)
- The former USSR (O.L. Einor, co-ordinator)
- Mongolia (M.V. Durante, S.S. Lazarev & E.E. Pavlova)
- Middle Eastern Platform (O. Monod & T. Weissbrod)
- Afghanistan (D. Vachard & C. Montenat)
- Iran (D. Vachard)

The volume is IUGS Publication No. 33 and will contain 520 pp., including some 100 figures and 79 fossil plates.

A leaflet with an order form will be sent to all those who have responded to the circular distributed in 1995. If you wish to record your interest in the volume and receive an order form please contact: Dr C.F. Winkler Prins, Nationaal Natuurhistorisch Museum Postbus 9517, 2300 RA LEIDEN, The Netherlands.

Fax: +31 715 133 344

E-mail: wp.pal@nmm.nl

# CONTRIBUTIONS BY MEMBERS

## ***Carboniferous of Central and Western Bohemia (Czech Republic)***

Jiří PEŠEK, Faculty of Science, Charles University, Albertov 6, 128 43 Prague 2, Czech Republic.

(61 pages, 33 figures in text, 57 photographs, 26 folders in a separate jacket; published (1994) by the Czech Geological Survey, Klárov 3, 118 21 Prague 1, Czech Republic - Price US\$15.00).

The Carboniferous of Central and Western Bohemia consists of continental sediments of the Westphalian C to Stephanian C. The knowledge of sedimentary filling is based upon the results of geological mapping, extensive studies of about 1200 boreholes drilled into the basement, geophysical surveys and other special investigations. The publication describing the geology of sedimentary filling is confined to four basic Upper Carboniferous units and their basement within the Upper Carboniferous basins. Description is supplemented by maps 1:400,000. Besides the basic characteristics, a list of plant micro- and macrofossils is provided for each unit. Brief characteristics of sub-units (beds, layers, seams) as well as the occurrence and distribution of volcanics, cyclic structure of sediments and other features are described in the paper. Particular attention is paid to their colour and paleogeography. Each basic unit and its important sub-units are shown in isopach maps, sand, volcanics and grey sediments abundance distribution, paleogeographic and paleofacies maps. Tectonic development of the studied area and a detailed list of references are presented.

## ***European Coal Conference 1995 - Report***

Jiří PEŠEK, Faculty of Science, Charles University, Albertov 6, 128 43 Prague 2, Czech Republic.

The European Coal Conference '95 (ECC '95) was held at the Faculty of Science of Charles Uni-

versity, 26 June - 1 July 1995. It was organised by this Faculty in co-operation with the Czech Geological Survey, the Institute of Geonics of the Czech Academy of Science and the Coal Geology Group of the Geological Society of London, UK.

The meeting itself took three days and was attended by 113 registered participants and about 20-30 guests from 13 (mostly European) countries. Presentations of 55 papers and 28 posters were made covering the following major topics related to coal-bearing units: geology, coal reserves, tectonics, geophysics, coal bed methane, coal petrology, coalification, coal technology, mineral matter and paleontology.

The three day meeting was preceded by two parallel one day field trips: the first to the north Bohemian Tertiary brown coal basin which was organised by Geological Service Co.Ltd, and the second to the limnic Carboniferous of the central and western Bohemia. The latter excursion was repeated after the conference and partly coincided with a three day field trip to the Carboniferous of the Upper Silesian Basin.

Participants in EEC '95 received a volume of abstracts of all presented papers and posters. Proceedings of the Conference, which will include the most important papers, will be published by the Publishing House of the Geological Society of London in 1996. Anticipated cost of the Proceedings will be around UK£50. There is still a limited number of Abstracts available which can be ordered at the following address: Professor Jirí PESEK, Faculty of Science, Charles University, Albertov 6, 128 43 Prague 2, Czech Republic. Cost of the copy is US\$20.

The next meeting of coal geologists is scheduled for 1997 at the University of Izmir, Turkey.

## ***Palynology of the Itararé Subgroup (late Paleozoic) in northern Paraná Basin, Brazil***

A.C. ROCHA-CAMPOS and L.E. ANELLI, Instituto de Geociências, Universidade de São Paulo, CP 11348, CEP 05422-970, São Paulo, SP, Brazil.

Analysis of surface and subsurface samples from the Itararé Subgroup (C-P) by SOUZA (1996) contributes to the biostratigraphy and paleoenvironmental interpretation of the northern Paraná Basin, Brazil.

One hundred and ten taxa were found, related to the twenty-six genera of spores, nine of pollen grains and three of microplanktonic elements. Forty-eight species are registered for the first time in the Paraná Basin, demonstrating the previous lack of knowledge of this part of the section.

The following taxa indicate a Westphalian age for the sections examined: *Granulatisporites varigranifer* Menéndez & Azcuy, 1969; *Raistrickia rotunda* Azcuy, 1975; *Dictyotriletes muricatus* (Kosanke) Smith & Butterworth, 1967; *Ahrensispores cristatus* Playford & Powis, 1979; *Ancistrospora inordinata* Menéndez & Azcuy, 1972; *Ancistrospora verrucosa* Menéndez & Azcuy, 1972; *Florinites guttatus* Felix & Burbridge, 1967; *Florinites occultus* Habib, 1966; and *Florinites* sp.

Biostratigraphic analysis indicates that the palynological content is new for the Brazilian part of the Paraná Basin. In terms of Gondwana, correlation is best made with the oldest Argentinian Carboniferous palynozones and equivalent palynozones in Australia.

Among the sporomorphs, the new species *Ancistrospora reticulata* n. sp. is described and another two are transferred to distinct genera: *Dictyotriletes pseudopalliatius* (Staplin) new comb. and *Vallatis-*

*potites punctatus* (Marques-Toigo) new comb.

In paleoenvironmental terms, the presence of microplanktonic elements referred to *Navifusa* Combaz, Lange & Pansart, 1967 indicates a marine influence for the great part of the sections studied.

#### Reference:

SOUZA, P.A. 1996. Palinologia e bioestratigrafia do Subgrupo Itararé em Araçoiaba da Serra (Westphaliano, Bacia do Paraná), Estado de São Paulo, Brasil. São Paulo. Masters Dissertation, Instituto de Geociências, USP, 192 pp, unpublished.

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### **Life mode of some Brazilian late Paleozoic Anomalodesmata**

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A.C. ROCHA-CAMPOS & L.E. ANELLI, Instituto de Geociências, Universidade de São Paulo, CP 11348, CEP 05422-970, São Paulo, SP, Brazil.

The life position of three late Paleozoic anomalodesmatan pelecypods was recognised in carbonate and siliciclastic rocks from Brazil (ANELLI, L.E. *et al.*, 1995). The *in situ* position was compared with previous interpretations based on functional anatomy.

Shelf-lagoonal carbonate facies of the Piauí Fm. (Morrowan-Atokan; Parnaíba Basin) shows *Wilkingia terminalis*, an immobile infaunal filter-feeding pelecypod, occurring preferentially associated with small bioclastic clumps and inclined 26° - 40° to bedding. Sections of oriented samples show clumps concentration around the ventral margins of the shells. The strong reduction of the anterior portion, the anisomyarian musculature, and the relatively large scar of the anterior (pedal/byssal?) retractor muscle in *W. terminalis* suggest an endobyssate life mode. In the same carbonates, the byssate, semi-infaunal *Pteronites* sp. (Pteriomorpha) occurs also associated with bioclastic clumps, and with the long axes of shells oriented ca. 90° to bedding. Evidence of diagenetic deformation is lacking in both cases. *Allorisma barringtoni* and *Vacunella* cf. *Vacunella etheridgei* from the Rio do Sul Formation (Early Permian,

Paraná Basin) occur in shallow marine fine siltstone with long axes inclined ca. 40°-50° to bedding. Specimens have been deformed by sediment compaction and therefore the angle between long axes and bedding has probably been reduced. One inch long tube preserved above the siphonal gape at the dorsal posterior angle of *A. barringtoni* corresponds to the former position of the syphon and reflects a minimum burial depth for the species. Except in the case of *W. terminalis* features described confirm previous interpretations based on functional anatomy.

#### Reference:

ANELLI, L.E., SIMÕES, M.G. & ROCHA-CAMPOS, A.C. 1995: Life mode of some Brazilian Late Paleozoic anomalodesmatan. *Canadian Paleontology Conference. Program and Abstracts*, 5, p. 2.

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### **Paleobiogeography and evolution of the late Paleozoic pelecypod faunas (Paraná Basin) from Brazil**

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A.C. ROCHA-CAMPOS and L.E. ANELLI, Instituto de Geociências, Universidade de São Paulo, CP 11348, CEP 05422-970, São Paulo, SP, Brazil.

In a recent contribution, SIMÕES *et al.* (1995) revise the paleobiogeographic evolution of late Paleozoic pelecypods from the Paraná Basin.

Late Paleozoic marine invertebrate assemblages (Tubarão and Passa Dois groups) in the Paraná Basin are dominated by pelecypods that evolved in an epicontinental sea having a complex geological and ecological history associated with a transgressive/regressive cycle. Tubarão Group assemblages (transgressive phase) are more diversified, with pelecypods, subordinate brachiopods, gastropods, echinoderms and rare arenaceous forams. In the Upper Tubarão Group, the Rio do Sul Formation assemblages (Rio da Areia, Baitaca) show a high proportion of epifaunal (mainly pectinids), filter-feeders together with elements of byssate semi-infauna and shallow infauna. Locally, in an organic-rich substrate (Pass-

inho assemblage), infaunal, detritivorous taxa dominate. Overlying the Rio Bonito and Palermo formations, assemblages are mostly composed of infaunal filter-feeding and semi-infaunal byssate elements, but epifaunal shells are sometimes locally abundant.

A contrasting pattern is shown by Passa Dois Group assemblages (regressive phase) which are dominated by infaunal, shallow-, intermediate-, and deep-burrowing, filter-feeding pelecypods associated with rare epifaunal filter-feeding, byssate elements. These pelecypods may have evolved *in situ*, from ancestors present in the Tubarão Group and in other South American Late Paleozoic marine sequences. Their evolution may have resulted from interruption to larval dispersion, leading to allopatric speciation. Rare elements, however, show wide distribution in the Paraná Basin suggesting dispersion of planktotrophic larvae during a short-lived flooding episode within the predominant regressive cycle.

#### Reference:

SIMÕES, M.G., ROCHA-CAMPOS, A.C. & ANELLI, L.E. 1995: Paleobiogeography and evolution of Permian pelecypod faunas from the Paraná Basin, Brazil. *Canadian Paleontology Conference. Program and Abstracts*, 5, p. 31.

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### **A correlation chart for Carboniferous-Permian zones in Argentina, Uruguay and Bolivia**

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Sergio ARCHANGELSKY, URQUIZA 1132, Vincente Lopez (1638), Buenos Aires, Argentina.

After the XII ICC-P Congress held in Buenos Aires in 1991, the Argentinian and Uruguayan geologists completed the text that was presented as a pre-print during the congress.

The final version is in press at the Córdoba Academy of Sciences and is scheduled to appear late this year. In this book, a chapter devoted to Zone Correlation includes a chart that is reproduced here with its corresponding legend. Data on which the chart was based are those published before the end of 1994 (Figure 1).

**Figure 1: A Correlation Chart of Carboniferous - Permian Zones of Argentina, Uruguay and Bolivia.**

The authors of the Chapter incorporating the table below include:

S. ARCHANGELSKY, C.L. AZCUY, S. CÉSARI, C. GONZÁLEZ, M. HÜNICKEN, A. MAZZONI & N. SABATTINI.

CUENCAS	AMBITO OCCIDENTAL													AMBITO ORIENTAL							CUENCA GONDWANICA URUGUAYA				BOLIVIA			
	TA'JA			RÍO BLANCO			CALING USPALL			PAGANZO			SAN RAFAEL			GOL	TEPUEL GENGA		SIERRAS AUSTR		MA	CH PA						
	Pal	Inv	Pb	Pal	Inv	Pb	Inv	Pb	Pal	Pal*	Inv	Pb	Pal	Pb	Inv	Pb	Pal	Inv	Pb	Pb	Pal	Inv	Pb	Pal	Ver	Con	For	
Ma																												
P Tar																												
260																												
P Tem																												
290																												
C Tar																												
320																												
C Tem																												
350																												

**LEGEND**

**BASINS:** TA'JA = TARJA; RÍO BLANCO; CALING USPALL = CALINGASTA-USPALLATA; PAGANZO; SAN RAFAEL; GOL = LA GOLONDRINA; TEPUEL-GENOA; SIERRAS AUSTR = SIERRAS AUSTRALES; MA = ISLAS MALVINAS; CH PA = CHACOPARANENSE; GONDWÁNICA URUGUAYA; BOLIVIA.

**PALEONTOLOGICAL GROUPS:** PAL = Palynology; INV = Marine Invertebrates; PB = Paleobotany; VER = Vertebrates; CON = Conodonts; FOR = Foraminifera.

**AGES:** P Tar = Late Permian; P Tem = Early Permian; C Tar = Late Carboniferous; C Tem = Early Carboniferous; M a = million years.

**PALYNOLOGICAL ZONES:** 'A', 'B' ( Tarija Basin ); Po (po) = Zone *Potonieisporites*; M = Association Malimán; PLIC = Superzone *Plicatipollenites*; an = Zone *Ancistospora*; iii = Zone III; PI = Zona *Plicatipollenites*; sz in = Subzone Interval; rp = Subzone *Raistrickia-Plicatipollenites*; Ju = Association Jume; PL = Zone *Potonieisporites - Lundbladisporea*; Cri = Zone *Cristatisporites* (i=lower, m=mid, s=upper); St = Zone *Stratites*.

**PALEOBOTANICAL ZONES:** AF = Zone *Archaeosigillaria-Frenguella*; NBG = Zone *Nothorhacopteris argentinica-Botrychiopsis weissiana-Ginkgophyllum diazii*; ZI = Zone of Interval; G = Zone *Gangamopteris* (s=upper, i=lower); AGI = Association Lower Arroyo Garrido; F = Superzone *Ferugliocladus*; nc = Zone *Nothorhacopteris chubutiana*; ge = Zone *Ginkgoites eximia*; D = Superzone *Dizeugotheca*; w = Zone *Dizeugotheca waltonii*; as = Zone *Asterotheca singeri*; GI = Zone *Glossopteris*.

**INVERTEBRATE ZONES:** P = Zone *Protocanites*; TS = Zone *Tivertonia - Streptorhynchus*; ZI = Zone of Interval; RB = Zone *Rugosochonetes-Bulahdelia*; Lev = Zone *Levipustula levis*; C = Zone *Cancrinella*; Eu = *Eurydesma* Fauna; Pz = *Pinzonella* Fauna; Eo = *Eosianites* Fauna.

**VERTEBRATE ZONES:** M = *Mesosaurus* Fauna; Pc = Fish Fauna.

**CONODONT ZONES:** Np-Sb = Zone *Neostreptognathodus pequopensis-Sweetognathus behnkeni*; Nb-Sw = Zone *Neogondoliella bisselli-Sweetognathus whitei*; Ie = Zone *Idiognathodus ellisoni*; Se = Zone *Streptognathodus elongatus*.

**FORAMINIFERA ZONES:** Eg = Zone *Eoparafusulina gracilis*; Pt = Zone *Pseudoschwagerina texana*; Tn = Zone *Triticites cf. nitens*.

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## **The Mid Carboniferous Boundary and the beginning of the glacial age in Argentina**

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CARLOS R. GONZÁLEZ, Instituto de Paleontología, Fundación Miguel Lillo, Miguel Lillo 251, 4000 S.M. de Tucumán, Rep. Argentina.

The recommendation of SCCS to establish the stratotype of the Mid Carboniferous Boundary in the Arrow Canyon section in Nevada confidently awaits the final vote of approval by ICS/IUGS. The appearance of the conodont *Declinognathodus noduliferus*, used to mark the boundary level, will not lessen the difficulty that Gondwana stratigraphers experience in trying to correlate their sections with those of the palaeo-equatorial belt.

Conformable marine fossiliferous deposits that range from Early to Late Carboniferous are exposed in both western and southern Argentina. In contrast with the Northern Hemisphere, where sediments were deposited in warm water, the Argentina sediments were genetically associated with glaciation. No conodonts, goniatitids, myalinids or fusulinids occur in highly endemic fossil faunas which are intercalated between these glacial sediments. The *Rugosochonetes-Bulahdelia* fauna of eastern Australia is associated with the oldest known glacial beds in western Argentina (González, 1990), and has close similarities with the *Marginirugus barringtonensis* fauna of eastern Australia, which was also accompanied by a deteriorating climate. In both countries, the *Levipustula levis* Zone overlies these biozones. In Australia, the limit between the *M. barringtonensis* Zone and the *Levipustula levis* Zone is placed at the Viséan-Namurian boundary (JONES, 1991), which is confirmed by absolute dating (ROBERTS *et al.*, 1995). This suggests that the Late Paleozoic Glacial Age initiated probably at or a little before the Mid Carboniferous Boundary in both western and eastern Gondwana.

Lithologic and paleontologic evidence show that during the Carboniferous, glaciers reached sea level in western Argentina and Patagonia. Also, three or perhaps four discrete glacial stages and interstages are present in the sediments of this age. It is surprising that such important cyclic events recorded by the Gondwana glaciations have not had a noteworthy correlative in the palaeo-equatorial belt. However, the beginning of the glacial age and the appearance of these "cold water faunas" may provide a reference level for Gondwana stratigraphy.

### References:

- GONZÁLEZ, C.R. 1990. Development of the late Paleozoic glaciations of the South American Gondwana in western Argentina. *Palaeo-3*, 79: 275-287; Elsevier.
- JONES, P.J. 1991. Australian Phanerozoic Timescales: 5. Carboniferous. *Records BMR, Australia*. 1989/35.
- ROBERTS, J., CLAOUË-LONG, J.C. & JONES, P.J. 1995. Australian Early Carboniferous Time. *SEPM Special Publication* 54: 23-40.

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## **Carboniferous of East Yakutiya, Russia**

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IGOR V. BUDNIKOV, Siberian Research Institute of Geology, Geophysics & Mineral Resources, Krasny pr. 67, Novosibirsk 630104, Russia; ALEXANDR G. KLETS, United Institute of Geology, Geophysics & Mineralogy, Universitetskii pr., 3, Novosibirsk, 630090, Russia; VITALY S. GRINENKO, State Yakutsk Exploration - Survey Expedition, Kalvitsa str., 24, Yakutsk, 677009, Russia; RUSLAN V. KUTYGIN, Institute of Geology, Lenina str., 39 Yakutsk, 677007, Russia.

Upper Paleozoic deposits are widely distributed within the limits of Siberia. Verkhoyanye is an especially interesting region, where Upper Paleozoic deposition is most complete. Exposed are thick (6.5 - 12 km), terrigenous deposits, reflecting uniform cyclic sedimentation, which formed within the limits of the passive continental frontier region.

Cyclic accumulation can be distinctly observed in structural, physical and genetic aspects of the sedimentary formations. This cyclicity is connected with oscillating

movement of the strand line as the result of eustatic fluctuations of sea level, during the gradual filling of the basin with sedimentary material. More than thirty years ago, a rhythmo-stratigraphic scheme was created as the basis for mapping within the limits of Western Verkhoyanye (Figure 2, sections III, IV).

The Permian and Carboniferous deposits are divided into rhythmosuites, each equivalent in time to about an epoch. The lower parts of each suite are composed mainly of fine-grained rocks, reflecting the transgressive stage of sedimentation, and contain a marine fauna. The upper subsuites consist mainly of coarse sandstones. Intermediate layers include fine-grained rocks which contain significant quantities of fossil bivalves and plants.

Figure 2 records five different sections that are exposed in the axial part of the Verkhoyansk Range. Separated from each other by varying positions relative to the coast line of the basin, and also with the time of accumulation, the initial phase of basin filling in each section records significant lithofacial and structural differences between the areas of deposition. However, despite the differences between sections, it is possible to devise a structural - genetic "skeleton" within which the framework of litho- and biostratigraphical data can be logically coordinated. Similar comments apply to overlapping Permian deposition (BUDNIKOV *et al.* 1995).

Broadly, early Carboniferous deposits comprise the basal Verkhoyansk Terrigenous Complex. At the end of the Tournaisian and the start of the Viséan, presumably during an epoch of rifting, the structural configuration and climate of the huge territory of Siberia and, in particular, in Verkhoyanye was changed. Terrigenous deposition was replaced mainly by carbonate sedimentation, as in sections I and V (fig. 1). In sections in the central part of the Verkhoyansk Range the basal terrigenous complex is not exposed.



It is important to observe that in thick sections of the Verkhoyansk Upper Paleozoic, Angaran floral complexes, located in the upper portion of each rhythm-suite and their analogues, are placed between boreal faunal complexes. This enables the deposits to be dated and removes many questions concerning the age of platform coal-bearing deposits of the Angara continent.

The Verkhoyansk Paleobasin is located in a special geographical position. Through Taimyr, it borders with the eastern European paleobasins, and to the south adjoins regions where there is a development of deposits with mixed Boreal-Tethys fauna.

Faunal investigations permit correlation with practically all of the international stages of the Upper Paleozoic and in particular with the Verkhoyansk Carboniferous. The most important faunal groups studied in Verkhoyanye are ammonoids and brachiopods, and to a lesser extent foraminifera, bivalves and flora. Brachiopods, composed mostly of Siberian species, are the most widespread benthic group which provide detailed subdivision and correlation of the various sections. Ammonoids, at some stratigraphic levels, usually connected with maximum transgression, enable the establishment of rather broad intercontinental correlations.

Four large complexes are distinguished in the Verkhoyansk Terigenous Carboniferous (fig. 2):

**I - brachiopods:** *Buxtonia*, *Stegacathia*, *Dictyoclostus*, *Chonetipustula*, *Leptagonia*, *Andreaspira*.

**Ia - ammonoids:** *Muensteroceras*, *Bollandoceras*, *Goniatites*; **brachiopods:** *Buxtonia rimmae*, *Inflatia sibirica*, *Sajakella migai*.

**Iib - ammonoids:** *Pachyroceras*, *Epicanites*; **brachiopods:** *Sajakella formosa*, *Antiquatonia posthindi*, *Lanipustula baicalensis*.

**IIIa - ammonoids:** *Yakutoceras*, *Aldanites*, *Stenopronorites*; **brachiopods:** *Balakhonia insinuata*, *Verkhotomia tukulaensis*, *Taimyrella afanasjevi*.

**IIIb - ammonoids:** *Orulganites*,

*Yakutoceras*, *Diaboloceras*, *Phanerocheras*, *Bisatoceras*, *Clisloceras*, *Aclistoceras*, *Christioceras*; **brachiopods:** *Verchyania kaschirzevi*, *V. cheraskovi*, *Muirwoodia martianovi*, *Neospirifer licharewi*.

**IV - ammonoids:** *Eoshumardites*, *Agathiceras*; **brachiopods:** *Plicatiferina neoplicatilis*, *Phricodothyris lenaensis*, *Settedabanian stepanovi*, *Tyramnia yakutica*.

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### Research on the Devonian and Carboniferous at Cologne University, Germany

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In 1991 I reported on this item from Marburg University (Newsl. Carb. Stratigr., 9, p. 14). Although the Marburg group is still active (Profs G. Hahn, R. Schmidt-Effing, Drs M. Amler, P. Bender and students), most of the younger members of the '91 report have finished their doctoral or habilitation theses, and have dispersed to other institutions. Information on the results of their studies and current addresses is still available via Marburg or Cologne.

In the beginning of 1995, I moved to Cologne University, where I occupy the Chair of Paleontology and Historical Geology. Research in the Late Devonian and Carboniferous of the mid-European Culm basins (Germany, to a lesser extent Polish Sudetes, Moravia) continues, directed mostly to microfacies, foraminifers and calcareous algae of Dinantian limestone turbidites and limestone clasts. Goals are reconstruction of source areas and biostratigraphic correlations

within the basins as well as with adjacent platforms. Moreover, factors controlling the deeper water facies sequences of the Late Devonian and Dinantian are evaluated (eustasy, climate, synsedimentary tectonics). Interests in similar deep-water sequences of the western Mediterranean Paleotethys are still alive, although no active research is taking place at the moment.

A new avenue of research is directed to the "anactulistic Carboniferous buildups", which developed after the end-Frasnian extinction. They are characterised by low-diversity communities and minor or missing contribution by evolved, complex metazoans. For example, coral-frameworks are almost notoriously missing, though, curiously, solitary and colonial Rugosa flourished in Dinantian shallow-water level bottom communities.

Some undergraduate students, two PhD students and Assistant Professor H. TRAGELEHN have commenced the following research:

B. MESTERMANN is trying to elucidate microfacies, microfossils, paleoecology and paleo-oceanographic significance of the late Viséan *crenistrina* limestone horizon. This is a peculiar cephalopod limestone event within the turbidite dominated Rhenoherynian Basin, which can be traced from the Harz Mountains across the Rheinische Schiefergebirge to SW England over a distance of more than one thousand kilometres.

H.M. WEBER is studying paleontology, biotic communities and microfacies of the Strunian (latest Famennian) stromatoporoid biotopes of westernmost Germany (Aachen area) and eastern Belgium. These are globally the youngest Paleozoic stromatoporoids. Questions are directed to the reasons for resurgence of that typical Devonian reef type in the Famennian and its final extinction at the DC boundary ("Lazarus effect of Devonian buildups or prologue of the Carboniferous-Permian reef cycle?").

H. TRAGELEHN is working on Devonian and Carboniferous biostratigraphy (conodonts, radiolaria, acritarchs) of pelagic sequences in the Saxothuringian zone of northern Bavaria, Thuringia and Saxonia (SE Germany). Microfacies and paleoecology of Dinantian shallow-water limestones ("Kohlenkalk") from the same area are addressed. The limestones are gravitationally reworked within the flysch basin and represent the relics of a completely vanished platform. Reconstruction of the source, mechanisms of redeposition and consequences for the structural development of the Saxothuringian zone will be elucidated.

### Mid Carboniferous Boundary position in Middle Siberia

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Throughout the entire Carboniferous and Permian, Middle Siberia was a part of the Angaran biogeographic region. The principal occurrences of Carboniferous deposits within Middle Siberia are located in the Kuznetsk Basin, the Minussinsk Trough and the Siberian Platform. As in many other regions of the World, the Carboniferous of Siberia displays a strongly developed two-fold subdivision.

The lower part of the System consists of marine (mainly in the Kuznetsk Basin) and terrestrial deposits which can be confidently correlated with the Tournaisian, Viséan and Serpuchovian (Namurian A) Stages of Western Europe. The unique feature of the Middle Siberian Lower Carboniferous is the presence of widespread ash tuff and tuffite deposits. Floral communities of this age are characterised by a majority of lepidophytes.

The Upper Carboniferous correlates in volume with the Namurian

B and C, Westphalian and Stephanian of Western Europe and contains thick, coal-bearing deposits. However, the recognition of any major units (Series, Stages) in this part of the succession, as well as the placement of the Carboniferous/Permian boundary, remains conjectural.

The boundary between the two major subdivisions in Middle Siberia is marked by strong changes in the floral assemblages, explained by S.V. MEYEN (1968) as being due to a rapid cooling of the climate. At this boundary, correlated with the base of the Bashkirian Stage, the contact between Namurian A and B, and the Mississippian/Pennsylvanian boundary, there is an extinction of practically all Lower Carboniferous lepidophytes and their replacement with pteridosperms. The latter in turn lasted for only a short time during the first part of the Bashkirian Stage before changing to pteridospermian-cordaitalian assemblages which then dominated the whole of the Upper Carboniferous sequence throughout Angaraland (S.V. MEYEN, 1982).

This floral change is accurately placed in spore-pollen spectra by the appearance of pollen of cordaites and large spores including: *Turrisporites sinuatus*, *Cyclogranisporites larvatus* Lub., *Planisporites mollis* Lub., and *Apiculiretusispora ciliaris* Pet. Above this boundary, the spectra contain increased numbers of spores belonging to the genera *Remysporites* and *Cyclobaculisporites* and a greater quantity and diversification of the pollen genera *Florinites*, *Potonieisporites* and *Plicatipollenites*. The archaic spores of *Retusotriletes*, typical for the upper part of the Lower Carboniferous, are still present in small amounts.

According to macro- and palynoflora, the boundary between the Upper and Lower Carboniferous Systems in Middle Siberia should be placed as follows: Kuznetsk Basin - in the middle part of the Yevseyevskaya Formation, between I and II phytohorizons (S.G. GORELOVA, 1962); Minussinsk

Trough - in the top of the Podsyn'skaya Formation; Siberian Platform - in the base of the Yantogotskiy Horizon.

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### Gondwana affinity microflora from Dingjiazhai Formation in Baoshan, West Yunnan, China

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The most marked Gondwana facies is developed in the Asselian to Sakmarian in Baoshan, West Yunnan, China. The Dingjiazhai Formation is represented by glacio-marine sediments. Its lower part contains diamictite, some of which shows striations on gravel surfaces; the middle part is marked by glacio-marine sediments containing the cold water fauna of *Stepanoviella*; the upper part yields fusulinids such as *Triticites* and the cold water fauna of *Lytvolasma*.

Palynomorphs have been recovered for the first time from the Dingjiazhai Formation in Baoshan, West Yunnan. The palyno-assemblage is very diverse and includes 40 form genera and 55 species including one new species *Plicatipollenites baoshanensis*. The assemblage is dominated by radially symmetrical triletes, monosaccites and non-taeniate disaccites. The miospore assemblages, assigned to the *Parasaccites distinctus* - *Microbaculispora fentula* (DF) zone of the Dingjiazhai Formation, are dominated characteristically by Gondwana microfloral elements which often constitute up to 80% or more of the assemblages. Many typical forms of the Gondwana microflora occur in this assemblage such as

*Parasaccites distinctus* Tiwari, *Barakarites* (Balme & Hennelly) Bharadwaj & Tiwari, *Potonieisporites neglectus* Potonie & Lele, *P. magnus* Lele & Karim, *Plicatipollenites densus* Srirastava, *Microbaculispora fentula* Tiwari, *M. fentula* Tiwari, *Interradispoda daedata* Foster, *I. robusta* (Foster) Foster, *Horriditriteles ramosus* (Balme & Hennelly) Bharadwaj & Salujha, *Cannanoropolis mehtae* (Lele) Bose & Mahoshwari, *?Virkipollenites triangularis* Potonie & Lele, *Striatopodocarpites rarus* (Balme & Salujha) Balme, *S. cancellatus* (Balme & Hennelly) Hart, *Protohaploxypinus amplius* (Balme & Hennelly) Hart, *Pteruchipollenites gracilis* (Segroves) Foster, *Strotersporites indicus* Tiwari, *Primuspollenites obscurus* Tiwari, *Distriatites insolitus* Bharadwaj & Salujha, and *Marsupipollenites triradiatus* Balme & Hennelly.

Comparison of the microfloras of West Yunnan, Cathayasia and Gondwana indicates that West Yunnan is much closer to Gondwana than Cathayasia, at least in terms of Clayton's microflora (1983). The *Parasaccites distinctus* - *Microbaculispora fentula* (DF) zone may be correlated approximately with the *Parasaccites* zone of KELE (1977) of Asselian to Sakmarian age. New palaeomagnetic results obtained from five basalt layers in the Upper Carboniferous in the Baoshan block show that in Late Carboniferous time it was situated at 34.1°S. This is evidence that the Baoshan block, like the Nyalam and Zainza blocks of Tibet, should be regarded as being part of Gondwanaland.

**Australian Working Group on Carboniferous Fishes**

SUSAN TURNER, Research Fellow, Co-Leader IGCP 328, Queensland Museum, P.O. Box 3300, South Brisbane, Queensland 4101, Australia.

This report presents a summary of the principal activities of this group:

KEN S.W. CAMPBELL (ANU, Canberra) in co-operation with DICK

FOX (U. Edmonton, Canada), DICK BARWICK (ANU) and JOHN LONG (WAM, Perth), are working on an Early Carboniferous (Viséan) macrofauna from the Raymond Formation of the Narrien Range.

JOHN A. LONG is investigating Early Carboniferous shark faunas of Western Australia in co-operation with S. TURNER.

SUSAN TURNER (Queensland Museum, S. Brisbane) is investigating a series of Carboniferous microvertebrate assemblages ranging from the D/C boundary to a presumed Bashkirian age; non-marine microfaunas are from the Upper Telemon and Raymond formations of the Narrien Range (including material donated by K.S.W. CAMPBELL) and the Ducabrook Formation near Bogantungan. The latter includes a new tetrapod-fish fauna from the mid Viséan, the first such from the Southern Hemisphere. Sue is working in conjunction with DR ANNE WARREN (La Trobe University) following initial discoveries by DR TONY THULBORN. Fish present include numerous spines of *Gyracanthides* sp., a rhizodont, a lungfish, palaeoniscoids and sharks. The presence of xenacanthoid shark teeth in this and the Narrien formations suggests the possibility of building up a zonation scheme for the early Carboniferous. These shark teeth are known from Scotland and Russia.

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[December 1995, No.16, 68 pp.; No. 17 in preparation].

Volumes 15 and 16 of *Ichthyolith Issues* contain extensive news about the recent activities of the members of this very active research group (IGCP 328 - International Palaeozoic Microvertebrate Correlation) which has maintained a strong affiliation with the Subcommittee on Devonian Stratigraphy. In the course of the project, research has included a number of Carboniferous studies, some details of which can be examined in the reference list which follows this contribution.

As IGCP 328 draws to a close, it has recently been announced that its successor project IGCP 406 - Circum-Arctic Palaeozoic Vertebrates will continue the aims of 328 and extend the sphere of interest to include Carboniferous-Permian-Mesozoic microvertebrate studies. Co-Leaders of the new project are DR TIJU MÄRSS (Tallinn, Estonia) and DR MARK V.H. WILSON (Edmonton, Canada). Full details of the project will appear on the Web site (listed below) and in *Ichthyolith Issues* 17. Participation in this project by interested Carboniferous workers is invited.

**CHECK OUT THESE WWW HOME PAGES**

More information on IGCP 328 (and the Devonian Subcommittee) can be viewed on the following World Wide Web Internet sites. [These pages are examples of the development suggested for the Carboniferous Subcommittee in the recent questionnaire. Feedback to the new executive would be appreciated. (Ed.)].

**Subcommission on Devonian Stratigraphy Home Page** - <http://geology.uta.edu/sdshome.html>

**Paleozoic Microvertebrates Home Page** - <http://gause.biology.ualberta.ca/wilson.hp/paleozoic.html>

Rather than try to extract material from *Ichthyolith Issues* relevant to the *Carboniferous Newsletter*, it would be more appropriate for SCCS members to subscribe to this very useful publication. The annual subscription (usually for two issues) is A\$20 and back issues are A\$5 each. Send your contribution to Dr Susan Turner, C/-Queensland Museum, P.O. Box 3300, South Brisbane, Qld 4101, Australia. Make your bank draft or cheque payable to "Queensland Museum (Microvertebrate Account)" or send credit card details (VISA, MASTERCARD, BANKCARD only). Sue can be contacted for further details by:  
PHONE: (+61 7 3840 7677)  
FAX: (+61 7 3846 1918) or Email <s.turner@mailbox.uq.oz.au>

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TURNER, S. in DRAPER, J.J. & LANG, S. (eds) 1995. *Geology of Devonian to Carboniferous Burdekin Basin*. Queensland Geological Record 1994/9: Dept Minerals & Energy: Queensland, incl. p. 39, 90.

TURNER, S. & BLIECK, A. 1995: Introduction - IGCP 328 State of Play. In TURNER, S. (ed.) *Palaeozoic Microvertebrates 1995 Report: Moscow-94 Workshop. Ichthyolith Issues Special Publication* no. 1: 5-8; IGCP 328: J.J. Zidek Serv., Socorro.

YOUNG, S. 1995: Stratigraphic distribution of British Carboniferous species of Acanthodes. In: *Premiers Vertébrés - Vertébrés Inférieurs* (VIIIe Congrès International, Paris, 4-9 septembre 1995). Résumés: 46.

## A chronology of Carboniferous Congresses and alternating Field & General Meetings

### Carboniferous Congresses

1. Heerlen, Netherlands 1927
2. Heerlen, Netherlands 1935
3. Heerlen, Netherlands 1951
4. Heerlen, Netherlands 1958
5. Paris, France 1963
6. Sheffield, UK 1967
7. Krefeld, Germany 1971
8. Moscow, Russia 1975
9. Urbana, USA 1979
10. Madrid, Spain 1983
11. Beijing, China 1987
12. Buenos Aires, Argentina 1991
13. Krakow, Poland 1995
14. [Canada, 1999]

### Field & General Meetings

- Sheffield, UK, 1965\*
- Liège, Belgium, 1969\*  
Cantabrian Mts, Spain, 1970
- Czechoslovakia, 1973
- Turkey, 1978
- Leeds, UK, 1981
- Argentina, 1986
- Utah/Nevada, USA, 1989
- Liège, Belgium, 1993\*
- [Australia, 1997]
- \* = Joint Meeting with CIMP  
[Brackets = proposed meetings]

## SCCS Office Bearers 1954 - 1996

Chairman	Term of Office
Professor Willem J. Jongmans	1954-1957
Professor William P. van Leckwijck	1957-1965
Professor T. Neville George	1965-1974
Dr Alexis Bouroz	1974-June 1980
Dr W.H.C. Ramsbottom	July 1980-June 1982
Dr R.H. Wagner	July 1982-June 1986
Dr W.H.C. Ramsbottom	July 1986-June 1989
Dr Eva Paproth	July 1989-July 1996
Professor John Roberts	August 1996+
Secretary	
Dr Robert H. Wagner	1963-1976
Dr Cor F. Winkler Prins	1976-June 1982
Dr Bruce Saunders	July 1982-June 1986
Dr Walter L. Manger	July 1986-Sept.1987
Dr Brian A. Engel	Sept.1987-July 1996
Dr Ian Metcalfe	August 1996+
Associate Secretary	
Dr Cor F. Winkler Prins	1973-1976
Dr Bruce Saunders	1976-June 1982
Dr Walter L. Manger	July 1982-June 1986
Dr Brian A. Engel	Oct. 1986-Sept.1987
Dr Hisayoshi Igo	Sept.1987-1992
(Position not filled since 1992+)	

# ABSTRACTS OF PAPERS

## ***Fusulináceos carboníferos del este de Asturias (N de España)***

ELISA VILLA (1995): *Biostratigraphie du Paléozoïque, Lyon, 13*, 261 p., 16 fig., 36 pl., 1 tabl.

This monograph deals with the study of the Carboniferous fusulinaceans of part of the Cantabrian Mountains and analyses materials from the Lower Bashkirian to the Upper Kasimovian. The chapter dealing with systematics includes the description of 128 species, five of which are new. Preceding that part, there are two chapters dealing with the geology of the Cantabrian Mountains and the stratigraphy of the Carboniferous deposits of this region. The final chapter establishes the stratigraphically most important species of fusulinaceans found in successive intervals and correlates these intervals with the Carboniferous of the former Soviet Union. There is an appendix indicating the fusulinacean contents, stratigraphic position and age of the 201 samples analysed. The monograph includes a summary in English (15 pages). This summary deals with the stratigraphy and age of the Carboniferous successions with special reference to their fusulinacean contents. New fusulinacean taxa are described both in the Spanish and English versions.

## ***The Carboniferous of Northwestern Serbia - Biostratigraphy and Geology***

S. STOJANOVIC-KUZENKO, V. PAJIC, N.W. ARCHBOLD (Biostratigraphy); I. FILIPOVIC, D. JOVANOVIC, L.J. MILOVANOVIC (Geology) (1995): Text 104 pp. (Serbian and English), Plates: Conodonts (1-24), Foraminifera & Algae (25-51), Brachiopoda (52-67), Flora (68-69). Text figures 1-27. Published as *Memoires du Service Geologique "Gemini"*, Tome XXV, Belgrade 1995.

For purchase details please contact: Geoloski zavod "Gemini", Karadjordjeva 48, Beograd, Jugoslavija.

## ***Biostratigraphy and evolution of Upper Carboniferous and Lower Permian smaller foraminifers from the Barents Sea (offshore Arctic Norway)***

J.R.GROVES & G.P. WAHLMAN (In press): *Journal of Paleontology*, 50 ms. pages, 9 figs.).

This paper documents the stratigraphic distribution of smaller foraminifers in the families Pseudovidalinidae, Syzranidae, Protonodosariidae, Geinitzidae and Pachyphloidae. A provisional biostratigraphic model for the High Arctic holds that the base of the Kasimovian is characterised by the appearances of *Protonodosaria* spp., "*Nodosinelloides*" spp. and *Hemigordius schlumbergeri*; the base of the Gzhelian by *Raphconilia modificata* and *Amphoratheca iniqua*; the upper Gzhelian by *Tezaquina clivuli* and *Cribrogenerina gigas*; and the base of the Asselian by *Geinitzina postcarbonica* and *Pachyphloia* spp.

Genus-level evolutionary scenarios are developed for the encountered taxa. Many Upper Carboniferous-Lower Permian foraminifers exhibit striking homomorphy with distantly related Upper Devonian-Lower Carboniferous taxa. Similar morphologies arose as a consequence of both iterative evolution and heterochronous convergence. Two phenotypic modifications, in particular, seem to have resulted in taxonomic radiations. Firstly, the acquisition of an outer pseudofibrous wall layer in forms that previously possessed only an undifferentiated microgranular wall led to the iterative development of predominantly Lower Carboniferous and Upper Carboniferous-Permian clades of archaeodiscaceans. A similar modification in wall structure led to the

Upper Carboniferous derivation of the Syzranidae from the Earlandiidae. Secondly, the transition from tubular to uniserial chamber morphology is manifest in the probable derivation of the Protonodosariidae from the Earlandiidae, and in the derivation of the Geinitzidae-Pachyphloidae from the Syzranidae.

## ***Diagenetic alteration of calcitic fossil shells: Proton microprobe (PIXE) as a trace element tool***

P. BRUCKSCHEN, F. BRUHN, J. MEIJER, A. STEPHAN & J. VEIZER (1995): *Nuclear Instruments and Methods in Physics, Research B* 104, 427-431, Figs 1-4.

Trace element contents (Mn, Fe, Sr) of a set of Lower Carboniferous brachiopod shell fragments have been measured using the Bochum proton microprobe. The resulting data are in good agreement with ICP measurements of the same shells and serve as a quantitative criterion to constrain the preservation state of the sample material for oxygen isotope analyses. Thus they help to interpret correctly the isotope data. Line-scans and elemental maps yield information on the lateral distribution of trace elements.

## ***<sup>87</sup>Sr/<sup>86</sup>Sr isotopic evolution of Lower Carboniferous seawater: Dinantian of western Europe***

P. BRUCKSCHEN, F. BRUHN, J. VEIZER & D. BUHL (1995): *Sedimentary Geology* 100, 63-81, Figs 1-7, Appendix 1.

A total of 175 Lower Carboniferous brachiopod shells were analysed for their <sup>87</sup>Sr/<sup>86</sup>Sr ratios together with geochemical tests for diagenetic alteration, the results of which suggested that any diagenetic recrystallisation was

achieved within a relatively closed diagenetic system.

The Sr isotope record of the Lower Carboniferous seawater is characterised by a decline in <sup>87</sup>Sr/<sup>86</sup>Sr ratio from 0.7082 at the Devonian/Carboniferous transition to 0.7076 in the mid-Viséan. Superimposed on this trend are higher-order fluctuations with a periodicity in the Ma range. The Dinantian seawater curve may potentially serve as a geochronological and correlation tool, particularly for the Hastarian to Lower Chadian interval.

### **Early Carboniferous tetrapods in Australia**

TONY THULBORN<sup>1</sup>, ANNE WARREN<sup>2</sup>, SUSAN TURNER<sup>3</sup> & TIM HAMLEY<sup>1</sup> 1995: *Nature* (in press).

<sup>1</sup>Dept of Geology, Univ. of Queensland, Queensland 4072, Australia.

<sup>2</sup>School of Zoology, La Trobe Univ., Bundoora, Victoria 3083, Australia.

<sup>3</sup>Queensland Museum, PO Box 3300, South Brisbane Queensland 4101, Australia.

The paper reports the discovery of possibly the oldest tetrapod fauna in the Southern Hemisphere. Collected from the Drummond Basin in Central Queensland, the fauna is dated as belonging to the

Early Carboniferous (mid Viséan) and contains at least three types of tetrapods in association with abundant freshwater fishes. Two of the tetrapods are distantly related to living amphibians and the third is an early relative of the amniotes. All three rank among the oldest representatives of the clades, and two of them represent groups previously confined to Europe and North America. The early age and taxonomic diversity of the fauna have implications for the current understanding of tetrapod history and indicate that several major groups of tetrapods were distributed worldwide through equatorial regions during the Early Carboniferous.

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## **EXPRESSIONS OF INTEREST**

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If you wish to be kept informed about the 1997 SCCS Field & General Meeting please fill in this form and return it to:

**Dr Ian Metcalfe**  
**Department of Geology & Geophysics**  
**University of New England**  
**Armidale NSW 2351, Australia**

Phone 61 67 732 860  
Fax 61 67 733 300  
E-mail: [sccs@une.edu.au](mailto:sccs@une.edu.au)

**My intentions concerning the SCCS Field & General Meeting in Australia are:**

- Definitely attending . . . . .
- Probably attending . . . . .
- Not attending . . . . .

I wish to present a paper:

Provisional title: \_\_\_\_\_  
\_\_\_\_\_

NAME \_\_\_\_\_

ORGANISATION \_\_\_\_\_

ADDRESS FOR CORRESPONDENCE \_\_\_\_\_  
\_\_\_\_\_

CITY, STATE, POSTCODE, COUNTRY \_\_\_\_\_  
\_\_\_\_\_

**This form was due to be returned on or before 31 July 1996. If you wish to reply, please do so as soon as possible. The second (final) circular will be sent only to those responding to this announcement.**

# SCCS FIELD AND GENERAL MEETING 1997 SOUTHERN NEW ENGLAND OROGEN, AUSTRALIA

## PRELIMINARY ANNOUNCEMENT

The next SCCS Field and General Meeting will be held in Australia from **15-25 September 1997**. Following an initial General Session at the University of New England in Armidale, ~ 500 km north of Sydney, there will be a 7 day field trip through the two major segments of the Southern New England Orogen.

The Central Complex of New England, a series of possibly allochthonous terranes and subduction complex rocks intruded by Late Carboniferous, Late Permian and Triassic granitoids, will be examined during a half day excursion from Armidale and on the first day of the field trip. The remainder of the trip will be spent examining Carboniferous rocks within the Tamworth Belt - marine and continental successions which accumulated in a fore-arc basin adjacent to a western continental volcanic arc.

### Tentative Itinerary & Details

- 15 Sept.** - Arrive Armidale by air  
**16 Sept. morning** - General Meeting Session  
**afternoon** - Excursion to Hillgrove to cure jet lag.  
**17 Sept.** - General Meeting Session (Papers)  
**Excursion Plan**  
**18 Sept.** - Granitoids and terranes of the Central Complex (Departs Armidale; travel to Bingara).  
**19 Sept.** - Viséan, Namurian and Westphalian succession at Rocky Creek, including glacials (Bingara).  
**20 Sept.** - Tournaisian-Viséan marine to continental sequence in Werrie Syncline (Tamworth).  
**21 Sept.** - Late Carboniferous glacials (The Gap), Tournaisian sequence at Glenbawn (Scone).  
**22 Sept.** - Viséan marine and ignimbrite-rich continental rocks at Rouchel; Late Viséan cyclical sequences and volcanics at Glennies Creek (Maitland).  
**23 Sept.** - Late Viséan volcanics; Tournaisian-Viséan shallow marine to turbiditic sequence Gresford-Dungog (Gloucester).  
**24 Sept.** - Late Viséan marine sequence, Rawdon Vale; Early Permian volcanics; *Levipustula levis* Zone (Raymond Terrace).  
**25 Sept.** - Travel from Raymond Terrace to Sydney (~ 3 hours).

**Accommodation:** Armidale - University College (single rooms); **Field Trip** - Motels. Twin share accommodation unless otherwise requested in advance.

**Post Field Trip Accommodation** in Sydney can be arranged by your travel agent or by the organisers.

**Meals:** Breakfast and dinner arranged at the college or motels. Picnic-style lunches will be provided during the field trip.

**Cost:** The estimated cost per person is US\$650, based on the current rate of exchange between the Australian and US dollars. This includes accommodation at Armidale, motel accommodation on the field trip, all meals (but not alcoholic beverages), and transport from Armidale to Sydney. It does not include the cost of travel to Armidale or accommodation in Sydney after the field trip. Transport on the field trip will be by minibus. **NOTE THAT THESE COSTS ARE BASED ON AN ESTIMATED ATTENDANCE OF 20 PEOPLE, TRANSPORT BY 21 SEAT MINIBUS, AND TWIN SHARE ACCOMMODATION AT MOTELS. THE ESTIMATED COST IS PRELIMINARY AND MAY CHANGE.** Single motel accommodation can be arranged if necessary. The surcharge for single motel accommodation is estimated to be US\$150, giving a total of US\$800.

**Travel to Armidale:** Consult your travel agent on airlines flying to Sydney, Australia. Two airlines service Armidale from Sydney: Eastern Australian Airlines and Hazelton Airlines. There are normally four flights to and from Armidale each day.

**Visa:** Please note that most overseas visitors to Australia will need to obtain a visa in order to enter the country.

**Information:** Further details concerning the meeting may be obtained from the following:

Professor John Roberts, Department of Applied Geology, University of New South Wales, Sydney NSW 2052, Australia Phone: 61 2 385 4279; Fax: 61 2 385 5935; e-mail: J.Roberts@unsw.edu.au

Dr Ian Metcalfe, Department of Geology & Geophysics, University of New England, Armidale NSW 2351, Australia Phone: 61 67 73 2860; Fax: 61 67 73 3300; e-mail: imetcalf@metz.une.edu.au

Dr Brian Engel, Department of Geology, University of Newcastle, Newcastle NSW 2308, Australia Phone: 61 49 21 5402; Fax 61 49 21 6925; e-mail: bengel@geology.newcastle.edu.au

#### Timetable

- Date of first circular posting: March 1996.
- Closing date for first circular replies: 31 July 1996.
- Proposed date of posting of final circular: December 1996.
- Final date for acceptances and deposits: 30 June 1997.
- Dates of Meeting 15-25 September 1997. Meeting commences in Armidale and ends in Sydney.

# CONFERENCES AND NOTICES

## PaleoForams '97

**Conference:**  
17-21 August 1997

**Place:**  
Western Washington University,  
Bellingham, WA (USA)

**Organisers:**  
**CHARLES A. ROSS**, Department of Geology, Western Washington University, WA  
**JUNE R.P. ROSS**, Department of Biology, Western Washington University, WA  
**PAUL BRECKLE**, Amoco Production Company, Houston, TX

**Pre-Conference Field Trip:**  
14-16 August 1997 - Late Devonian through Permian strata of accreted terranes in southwestern British Columbia (Canada), organised by **J.H.W. MONGER** (Geological Survey of Canada) and others.

**Post-Conference Field Trip:**  
22-24 August 1997- Carboniferous of Arrow Canyon and the Mid Carboniferous Boundary, southern Nevada, USA, organised by **RICK PAGE** (US Geological Survey) and **PAUL BRECKLE**.

Studies of Paleozoic foraminifera include a number of general, as well as several unique, interests and interpretations that lend themselves well to a specialists' meeting. The conference topics are designed to address these, as well as more traditional questions. An initial list of topics for which talks and/or posters are solicited include:

- Evolution, dispersal and paleobiogeography;
- Classification and taxonomy;
- Biostratigraphy and zonation;
- Paleocologic and sedimentary environments of deposition;

- Biological interpretations and significance;
- Numerical and statistical methods;
- Composite standard sections and their utility in foraminifera biostratigraphy;
- New techniques.

At this time the organisers welcome additional topics that participants wish to have included.

Please address correspondence to:

Charles A. Ross  
Department of Geology  
Western Washington University  
Bellingham, WA 98225-9080

PHONE: +1 360 650 3634  
FAX: +1 360 650 3148  
E-mail:  
rossjrp@henson.cc.wvu.edu

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## PaleoForams '97

Please return this part to: Charles A. Ross, Department of Geology, Western Washington University, Bellingham, WA 98225-9080, USA.

NAME: -----

ADDRESS: -----  
-----  
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My interest in attending the August 1997 PaleoForams '97 conference in Bellingham, WA.

- definitely plan to attend
- probably will be able to attend
- possibly will attend, but uncertain

I plan to present (co-author) a talk  and/or a poster  (please check) about:  
-----

I plan to participate in the:

- Pre-conference field trip to the Devonian through Permian in southwestern British Columbia.
- Post-conference field trip to the Carboniferous in Arrow Canyon, Nevada.

# PRELIMINARY QUESTIONNAIRE RESULTS

At the beginning of 1996, the membership of SCCS was asked to undertake the completion of a questionnaire which was designed to assess the range of interests and activities of all members. To date, 140 have replied out of a population of 278, and as more respond, it will become possible to expand this preliminary analysis to incorporate all the incoming data.

Concerned at the declining support that Stratigraphy and Palaeontol-

ogy are being given by teaching institutions, companies, government organisations and, in particular, funding bodies associated with these organisations, it was deemed appropriate that an assessment of our own level of activity should precede a more intensive external drive for greater levels of support. As practitioners, we are well aware of the dependence that many of our field colleagues place on our work and one of the tasks before us is to marshal that wider support

into a firm campaign to restore the disciplines to their central role in furthering the understanding of geology in its widest sense.

The following very preliminary analysis was prepared in some haste by the Editor who apologises for any misinterpretations of the data which may have occurred during the compilation process and the preparation of this edition of the *Newsletter* (Ed.).

## QUESTION 3. Special Interest areas:

DISCIPLINE (Total sample 140 replies)	Primary Interest	Secondary Interest	Tertiary Interest
<b>STRATIGRAPHY</b>			
Biostratigraphy	70	26	6
Correlation	31	8	4
Lithostratigraphy	17	1	0
Biogeography	16	9	12
Sequence Stratigraphy	15	2	3
Field Mapping	6	0	2
General Stratigraphy	5	2	3
Magnetostratigraphy	4	0	0
Palaeomagnetism	1	0	0
<b>PALAEONTOLOGY</b>			
Invertebrate Palaeontology	24	17	6
Palaeobotany	11	9	1
Microfossils	8	28	3
Palynology	5	7	1
General Palaeontology	0	7	2
Vertebrate Palaeontology	0	1	0
<b>PALAEOECOLOGY</b>	5	7	23
<b>PALAEOCLIMATOLOGY</b>	2	8	8
<b>SEDIMENTOLOGY/PETROLOGY</b>	2	6	7
<b>ECONOMIC/ENERGY SOURCES</b>	2	2	9
<b>GEOCHRONOLOGY</b>			
Absolute Ages	1	3	2
Time Scales	0	5	3
<b>GEOCHEMISTRY</b>	1	3	1
<b>GEOPHYSICS</b>	0	1	0
<b>STRUCTURE/GEOTECTONICS</b>	0	3	9

**PRELIMINARY ANALYSIS:** Exactly half the replies received (70) rated their primary interest to be the study of **Carboniferous Biostratigraphy**. Other significant primary interests, listed in decreasing order of choice were: Stratigraphic Correlation (31), Invertebrate Palaeontology (24), Lithostratigraphy (17), Biogeography (16), Sequence Stratigraphy (15) and Palaeobotany (11). [Note that the numbers should not be accumulated since many members signalled more than one primary choice].

The secondary choices were dominated by Microfossils (28) and Biostratigraphy (26), with Invertebrate Palaeontology (17) the only other field to exceed 10 in number. Predictably, many of these choices were accompanied by a third selection of Palaeoecology (23) or Biogeography (12).

The major conclusion to be drawn from the above table is that, predictably, most members see themselves primarily as **Stratigraphers** who utilise the various fields of **Palaeontology** as an essential adjunct to their work. The low levels of interest in many of the other fields, especially Geochronology, is a matter of some concern that needs to be addressed.

#### **QUESTION 4. Regional Studies:**

The following regions were listed by the SCCS membership as being the principal areas where their studies are being undertaken at the present time.

**Algeria** - Sahara Desert.

**Argentina** - Buenos Aires, Chubut, La Rioja, Mendoza, San Juan & Santa Cruz Provinces.

**Australia** - Bonaparte, Canning, Carnarvon & Fitzroy Basins, WA; Central Queensland; New England Orogen; Tamworth Belt; Yarrol Trough.

**Austria** - Carinthia; Carnic Alps; Gurutal Nappe; Karawanken Mts.

**Belgium** - Ardennes Mts; Dinant synclinorium.

**Bolivia** - Andean Region; Titicaca Lake.

**Brazil** - Amazon, Paraná, Parníba Basins.

**Bulgaria** - Northeast, Svoge Basin

**Canada** - Alberta; Arctic Archipelago; British Columbia; Cordillera; NW Territories; Northwest; West; Nova Scotia - Sydney area.

**Czech Republic** - Moravia; Silesian Region.

**China** - Autonomous region; Guangxi, Guizhou, Hunan, Xinjiang Provinces; Tarim Basin.

**Egypt** - Eastern Desert; Sinai.

**Europe** - General studies.

**France** - Franco-Belgian Basin; Montagne Noire; Massif Central; Pyrénées.

**Germany** - Frankenwald; Harz; North Rhine-Westphalia; Rheinisches Schiefergebirge; Ruhr Basin; Saar-Nahe Basin; Saarland; Sachsen; Thuringia.

**Greenland** - Arctic.

**Hungary** - General studies.

**Indonesia** - Irian Jaya; Sumatra; Timor.

**Ireland** - County Claire; North Sea drilling; West/NW Ireland.

**Japan** - Fukuoka, Honshu, Niigata, Okayama, Yamaguchi Prefectures; Kitakami Belt; Hida Gaien Belt; Northeast Japan.

**Mexico** - General studies.

**Morocco** - Anti-Atlas, Meseta.

**New Zealand** - Southern Alps.

**Norway** - Barents Sea; offshore wells; Oslo.

**Peru** - Andean region; Urubamba River.

**Poland** - Holy Cross Mts; Krakow; Lubin Upland.

**Portugal** - Iberian Pyrite Belt; Osa Morena Zone.

**Russia** - Arctic; Donetz Basin; Kazakhstan; Komi Republic; Mongolia; Moscow Syncline; North Caspian Basin; North Timan; Rostov region; Siberia; Timan-Pechora Basin; Urals; Volga-Urals.

**Saudi Arabia** - (subsurface).

**Slovenia** - Karavanke Mts.

**Southeast Asia** - General studies.

**Spain** - Betic Cordillera; Cantabrian Mts; Asturias, Badajoz, Cantabria, Córdoba, Ciudad Real, León, Palencia, & Tervel Provinces; Pyrénées; Sierra Morena.

**Thailand** - Northeast, north.

**The Netherlands** - (subsurface).

**Turkey** - Istanbul area.

**Ukraine** - Donbass.

**United Kingdom** - Wales; Yorkshire.

**USA** - States of Alaska, Arizona, California, Illinois, Indiana, Iowa, Kansas, Kentucky, Maryland, Missouri, Montana, Nevada, New Mexico, Ohio, Oklahoma, Oregon, Pennsylvania, Texas, Utah, Washington, West Virginia; Appalachian & Illinois Basins; Midcontinent; Cordillera.

**Yugoslavia** - Serbia

## QUESTION 5. Field Mapping Areas:

Of the 140 replies received, 39 SCCS members indicated that they have undertaken field mapping in the past three years. The following regions were listed as the principal areas of investigation and the nature of each project is summarised in the third column of the table. As this was a very preliminary analysis of the data supplied, the summary has been greatly abbreviated and is not fully representative of the information available.

COUNTRY	REGIONAL LOCATION	MAPPING PROJECT
Australia	New England Orogen: Tamworth Belt	Geochronology; magnetostratigraphy
	Sydney Basin	Biostratigraphy
Austria	Austria	1:50,000 systematic mapping
	Austria	Student mapping; research
Belgium	Belgium	Rugose biostratigraphy
Canada	Nova Scotia	Regional biostratigraphic correlation
China	China	Rugose biostratigraphy
	Hainan Island	Research Project
	Xinjiang Province	Echinoderm faunas
Czech Republic	Moravia	1:50,000 systematic mapping
France	France	Rugose biostratigraphy
	Massif Central	Revision of Stephanian Stratotype
Germany	Germany	Coal exploration
Ireland	Counties of Mayo, Limerick	Student instruction
	Ireland	Basin evolution, microfacies analysis
Japan	Nagasaka District	Tectonics/biostratigraphy
	Okayama Prefecture	Foraminifera zonation
	Fukushima Prefecture	Lower Carboniferous correlation
	Yamaguchi Prefecture	Fusulinids, local stratigraphy
	South Kitakami Terrane	Geotectonics
New Zealand	Southern Alps	Stratigraphy and structure
Poland	Lubin Upland	Basin analysis
Portugal	South Portuguese & Ossa Morena Zone	Regional mapping/economic evaluation
Russia	East Donetz/Ciscaucas	Petroleum Geology
	Timan-Pechora Province, N. Timan	Moscovian-Kasimovian boundary forams
	Siberian Platform	Precious minerals search
	Urals - north and west slope	1:200,000 regional mapping/minerals
Spain	Asturias, Picos de Europa	Regional mapping
	Cantabrian Mountains	Palaeogeography; student mapping
	Iberian Range	Student mapping
	Palencia	Re-interpretation of Carb. stratigraphy
	Sierra Morena	1:50,000 mapping/Strat./Sedim./Palaeontology
Thailand	North east Thailand	Foraminifer zones/stratigraphic mapping
Turkey	Karaburum Peninsula	Stratigraphic mapping
USA	Arizona	Section studies
	California, Sierra Nevadas	Stratigraphic studies
	Colorado	Research project
	Illinois	Coal resources; L. Pennsylvanian
	Kansas	Correlation
	New Mexico	Regional mapping
	Nevada, Arrow Canyon region	Basin evolution; microfacies analysis

### CONTINUED MEMBERSHIP OF SCCS

On the front of the questionnaire forwarded to members of SCCS, a special message requested everyone to return **AT LEAST THE COMPLETED FRONT PAGE** indicating if:

1. Their address was correct; and
2. They wished to continue as Corresponding Members and to receive the *Carboniferous Newsletter*.

At present, 138 members have NOT returned this information. If you wish to remain on the mailing list, it is essential that this front page of the questionnaire (or a note/e-mail) be returned to the new Secretary, Dr Ian Metcalfe, Department of Geology & Geophysics, University of New England, Armidale NSW 2351 Australia. (Tel: +61 67 732 860; Fax: +61 67 733 300; e-mail: [sccs@une.edu.au](mailto:sccs@une.edu.au)). Please make sure this is not your last Newsletter!!!

## QUESTION 6. Publications by SCCS Members in 1995:

The following list of references has been compiled from data submitted in the recent questionnaire completed by SCCS Members. It was not practical to include any abstract references since most of the 348 abstracts for papers given at the 1995 XIII Carboniferous-Permian Congress (Kraków, Poland) contained information about the Carboniferous and would have made the listing excessively long. The contents of the Congress Abstract volume should be read in conjunction with this listing.

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## Question 7. The Future of SCCS

This question elicited a wide range of responses for which an adequate summary was not possible in the time available. Appended below is an uncritical and unsorted extract of suggestions from the membership from which it may be possible to distill a framework for the future development of the Subcommittee. Your more detailed proposals directed to the new Chairman/Secretary would be greatly appreciated (Ed.).

- Closer relationship with Gondwana Subcommittee.
- Prepare regional summaries of local sedimentary basins.
- Establish correlation with the classic palaeoequatorial belt and the regions of Angara and Gondwana.
- Correlation of marine - non-marine sections and global magnetostratigraphic sections.
- Establish more widespread numerical timescales.
- Prepare Intercontinental correlation charts.
- Co-ordinate/integrate biochronology, biostratigraphy and geochronology.
- Support the establishment of a large, global database of biozonations and numerical ages extending the work of P. Jones (1995) at AGSO, Australia.
- Foster IGCP Projects with a Carboniferous content or 'flavour'.
- Encourage use of specific fossil groups in correlation and sequence stratigraphy.
- Publish thematic issues in particular journals on the above topic.
- Forward plan for updates of the '*Carboniferous of the World*'.
- Calibrate the timescale with dates from all type areas - seek research support for access to SHRIMP microprobe dating of type sections.
- Encourage greater efforts on biogeography.
- More information about SE Asia and Africa for a global understanding of the Carboniferous.
- Foster a multi-author publication giving normalised data about all regional stages.
- Projects integrating bio- and sequence stratigraphy.
- Palaeogeography and palaeobiogeography of the Carboniferous.
- International effort to produce up to date palaeogeographic and palaeobiogeographic maps for the Carboniferous subdivisions of all continents.
- Include sedimentology, sequence stratigraphy, palaeoecology and absolute ages in any definition of stratotype boundaries.
- Expand the use of sequence stratigraphy. Investigate the evidence for global cycles.
- Program specialist workshops to define the value of all palaeontological groups in the Carboniferous.
- Distribute bibliographies of Carboniferous workers and their projects, proposals, etc.
- Regional group meetings to integrate SCCS with internal subcommittees of many countries.
- Establish primary boundaries for the Carboniferous, supported by much greater detailed information in fields such as palaeogeography and palaeoecology with special interest on the physiology of animals and their response to the environment.
- Stratigraphic analysis of palaeoenvironmental events through the Carboniferous.
- Correlate stable isotope analysis and faunal succession in the Carboniferous.
- Establish a global eustatic curve.
- The function of SCCS must remain essentially the same.
- SCCS committees to deal with:
  1. Methodology - consider biostratigraphy in conjunction with sequence and event stratigraphy, magnetostratigraphy, and dating.
  2. Global boundaries of major chronostratigraphic units.
  3. Integrate regional chronostratigraphic classifications which evolved within palaeogeographic areas, especially where different palaeolatitudes are involved.
- Try to raise funds to support young geologists to participate in SCCS projects. Better publicity about SCCS to undergraduate and graduate students.
- Taxpayers would appreciate more attention to applied research as well as basic - place more emphasis on energy and mineral resource characterisation and mapping.
- Publish detailed correlation charts.
- Promote better co-ordination between Carboniferous workers.
- Investigate Carboniferous glaciation as a predictor for potential greenhouse events. Establish test models of biotic response to ice-age and greenhouse transitions.
- Meetings are not needed for progress to be made. Let us be more aggressive and depend more on the *Newsletter*, an already effective vehicle for communication.
- Produce Stage level interpretative maps for the whole of the Carboniferous.
- Study global problems such as climate, palaeogeography, effects on terrestrial and marine organisms.

### Question 7C. Frequency of Meetings/Publications of SCCS:

Of the 140 replies received, 62 expressed an opinion about the frequency of SCCS meetings. Of these, 44 opted for the present arrangement (each two years), with 8 suggesting an annual meeting, and a further 9 proposing that SCCS should organise Workshops or Project Group meetings in conjunction with other organisations at their National Meetings within various countries.

A universal restriction on the scheduling of more frequent meetings was the difficulty of obtaining sufficient funds to be able to travel. Some members

stressed that they had great difficulty in obtaining funds to attend with the current two-year program.

Opinion was divided on the frequency of publication of the *Newsletter* - of the 54 who commented, 34 preferred the current annual publication while 20 opted for a more frequent program of two issues per year. It was pointed out that the Triassic Sub-commission had moved to two issues of its *Newsletter* per year and the consequent editorial load had become very demanding. Their experience was that greater frequency of publication more than doubled the quantity of material offered for publication.

### Question 7D. The Internet and SCCS:

Inadvertently, this question confused two issues by suggesting that use of the Internet would result in a move to electronic publication of the *Newsletter* on the Internet. It was a widely expressed opinion that most members will continue to want a paper copy on their desk, with very few opting for the alternative.

In respect of the establishment of a Home Page on the Internet, the response was fairly predictable - those with access thought it a brilliant idea while those who do not have the necessary equipment or expertise did not reply. The key element in the discussion was that this should be seen as an inevitable development which, given a little more time, will spread into all areas of the globe but that for the present it should be seen as an experimental project which must not exclude those who cannot participate. Since Home Pages generally tend to contain fairly static data between updates they could be reprinted in the *Newsletter* and sent to those members who make a special request for same.

For a more immediate exchange of data, a discussion group should be established on the Internet where members can ask questions and receive replies in a public forum. This contact requires members to log on to their system regularly, to read any enquiries or questions, and to reply where possible. This is the public equivalent of the more private e-mail system which many members are already using. Again, it does not cater for the *electronically-deprived* but published summaries of the exchanges could be organised.

The analysis of the questionnaire responses in the table below has been arranged by countries and although the total number of responses is relatively low, it does give a broad indication of those regions where electronic contact has penetrated up to the present time. Many members added qualifications to their support, details of which are discussed above but not included in the table. It must be stressed that the scene is changing rapidly and that many members have indicated that their connection will occur in the near future.

Country	Internet Support	Total Responses
Argentina	2	4
Australia	8	12
Austria	2	2
Belgium	2	3
Brazil	1	1
Bulgaria	1	1
Canada	7	8
Czech Republic	2	4
Egypt	0	1
France	2	6
Germany	8	13
Hungary	1	1

Ireland	1	1
Japan	5	13
New Zealand	1	1
P.R. China	0	5
Poland	2	2
Portugal	2	2
Russia	5	13
Slovenia	1	1
South Africa	1	2
Spain	3	5
The Netherlands	1	4
United Kingdom	5	7
United States	24	28
TOTAL	87	140

Sincere thanks to all those members who have provided the above information

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Please check your entry and report any changes to the Secretary

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