SCCS

IUGS Subcommission on Carboniferous Stratigraphy

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Dr. W.H.C. Ramsbottom, Vice-Chairman

Dr. W.B. Saunders, Secretary

Dr. W.L. Manger, Associate Secretary

Newsletter on Carboniferous Stratigraphy

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The Newsletter on Carboniferous Stratigraphy is distributed to both titular and corresponding memebrs of S.C.C.S. free of charge. Other persons or institutions interested in receiving the Newsletter may subscribe at an annual fee of US $ 5.00, to be paid to the editor, Dr. W.B. Saunders. If this moderate price causes any problems, please do not hesitate to contact the editor to arrange some other solution, such as an exchange.

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REPORT OF THE IUGS SUBCOMMISSION ON CARBONIFEROUS STRATIGRAPHY

(GENERAL ASSEMBLY IN MADRID, SEPTEMBER 1983)

The General Assembly on the occasion of the Xth International Congress of Carboniferous Stratigraphy and Geology was well attended by both Titular and Corresponding Members. Approximately 50 persons, representing 16 countries, attended two full day meetings on 10-11 Sept., preceding the Congress, and two afternoon sessions during the Congress. A special meeting of the Titular Members consolidated the results obtained during the open meetings. Subsequently, the West European members of the Subcommission met to resolve questions of regional chronostratigraphic classification in Western Europe. As is customary, a summary of this report was read by the Chairman at the closing session of the full Carboniferous Congress. This included grateful acknowledgement of the facilities provided by the Congress Organization.

Membership

The Titular Membership of the Subcommission has been recently expanded to admit the chairmen of working groups on the Carboniferous of China. The General Assembly at Madrid was the first time that three of the Chinese members attended. Their presence was noted with pleasure.

One of the Titular Members for North America, Dr. C. Collinson, officially resigned, and was replaced by Dr. T. Dutro. Another resignation involved Dr. M. Lys, the Chairman of the Working Group on North Africa. Dr. M. Weyant was elected as the new Chairman of this Working Group. In view of the importance of the Mid-Carboniferous Boundary Committee chaired by Dr. H.R. Lane, it was deemed appropriate to convert this ad-hoc committee into an official Working Group of the Subcommission. It was regarded as equally appropriate to elect Dr. Lane as the Chairman of this Working Group. The high level of achievement of the ad-hoc committee was duly noted and gratitude expressed for the hard work and effective chairmanship that this represented. The official appointment of the new titular members is subject to the approval of the IUGS Commission on Stratigraphy.

The Subcommission noted, with profound regret, the untimely death of Professor Anders Martinsson, the Chairman of the IUGS Commission on Stratigraphy. Another tragic loss reported during this meeting was the decease of Yves Lemosquet, Corresponding Member of the SCCS. It was recalled that Yves was largely instrumental in compiling the vast amount of information made available on North Africa for 'The Carboniferous of the World', and that his effective involvement in the work of the Subcommission would have undoubtedly led to his election as Titular Member of SCCS.

The Subcommission membership as it stands at present, is reported as follows (Titular Members in relation to the areas and intervals for which they are responsible as Chairmen of the corresponding Working Groups):

Executive Bureau

R.H. Wagner - Chairman
W.H.C. Ramsbottom - Vice Chairman
W.B. Saunders - Secretary
W.L. Manger - Associate Secretary

Past Chairman

A. Bouroz

Chairmen of Working Groups

East Europe and Siberia	
Angaraland	- S.V. Meyen
Kasimovian/Gzhelian	- A.D. Grigorieva
Moscovian	- M.N. Solovieva
Serpukhovian/Bashkirian	- O.L. Einor
Tournaisian/Visean	- E.A. Reitlinger
West and Central Europe	
upper Stephanian	- J. Doubinger
lower Stephanian	- R.H. Wagner
Westphalian D.	- J.P. Laveine
Westphalian A, B, C	- C.F. Winkler-Prins
Namurian	- E. Paproth
North Africa	- M. Weyant
North America	
upper Pennsylvanian	- R.M. Kosanke
middle Pennsylvanian	- P.K. Sutherland
lower Pennsylvanian/Chester	- M. Gordon, Jr.
Mississippian of USA (pre-Chester)	- T. Dutro
Mississippian of Canada	- B.L. Mamet
China	
upper Carboniferous	- Li Xingxue
middle Carboniferous	- Gao Lianda
lower Carboniferous	- Yang Shipu
coal-bearing intervals	- Yang Xilu
Tianshan-Hinggan region	- Guo Hongzun
Japan	- M. Minato [1]
Gondwanaland	
Australia	- J. Roberts
South America (terrestrial)	- S. Archangelsky
South America (marine)	- A.C. Rocha Campos
Mid-Carboniferous Boundary	- H.R. Lane

[1] deceased April 14, 1984

Position of the mid-Carboniferous boundary

Most of the pre-Congress meeting on 10 and 11 October was taken up by the comprehensive report submitted by Dr. H.R. Lane, Chairman of the ad-hoc committee charged with the investigation and evaluation of information regarding a possible lower-middle Carboniferous boundary, with emphasis on biostratigraphic information provided and views expressed at the mid-Carboniferous boundary Symposium held in Leeds, England, August 1981.

The Committee submitted a concrete proposal on the level at which a mid-Carboniferous boundary should be taken and this was expressed in five recommendations followed by ten detailed submissions on potential boundary-stratotypes in different parts of the world. This followed the deliberate pattern of first deciding on the stratigraphic level, as controlled by biostratigraphic data (see: BIOSTRATIGRAPHIC DATA FOR A MID-CARBONIFEROUS BOUNDARY, W.H.C. Ramsbottom, W.B. Saunders and B. Owens, Eds. - IUGS Subcomm. Carb. Strat., Leeds, 1982), and to examine potential stratotypes subsequently. Submissions regarding the latter were made by specialists from six different countries ranging from North America through Western Europe and the USSR into China. Titles are as follows:

1. Tentative Discussion on the Mid-Carboniferous Boundary of China, by Yang Jing-Zhi, (Peoples Republic of China).

2. On the Eostaffella fauna, by Zhang Lin-Xin, (Peoples Republic of China).

3. The Upper Serpukhovian of the Donetz Basin and Lower and Middle Carboniferous Boundary, by Aisenberg D., Brazhnikova, N., Nemirovskaya, T., and Poletaev, V., (USSR).

4. La Limite Mississippian-Pennsylvanian dans les Pyrenees Francaises, by Perret, M.F., (France).

5. Recognition of a mid-Carboniferous boundary in the Pennine Province, England, by Ramsbottom, W.H.C., Higgins, A.C. and Owens, B.

6. The Mid-Carboniferous Boundary in the Bechar Basin (Algeria), by Lemosquet, Y., Lys, M., Pareyn, C., and Weyant, M. (France).

7. Boundary Stratotype for the Base of the Pennsylvanian System, East-Central Appalachian Basin, U.S.A., by England, K.J., Henry, T.W., Gillespie, W.H., Pfefferkorn, H.W., and Gordon, M., Jr. (USA).

8. Mid-Carboniferous Biostratigraphic Relations, Southern Mid-Continent, North America, by Manger, W.L., Sutherland, P.K. (USA)

9. Latest Mississippian-Earliest Pennsylvanian, (Namurian) Conodont Biostratigraphy of the Northern Rocky Mountains, U.S.A., by Wardlaw, B.R. (USA).

10. Possible Mid-Carboniferous Boundary Stratotype in South Central Idaho, by Skipp, B., Baesemann, J.R., and Brenckle, P.L. (USA).

11. Arrow Canyon, Nevada, a Potential Mid-Carboniferous Boundary Stratotype Section, by Lane, H.R., Brenckle, P.L., and West, R.R., (USA).

12. A Sedimentologically Continuous Section Across the Mississippian-Pennsylvanian Boundary, Granite Mountain, Utah, U.S.A., by Gordon, M., Jr., Henry, T.W., and Mamet, B. (USA).

The recommendations made by the mid-Carboniferous boundary committee were discussed extensively in a general debate on Sunday, 11 September. This debate was particularly useful in highlighting the necessity to define a boundary which can be used not only in the palaeoequatorial belt of Carboniferous times (which contains the most detailed biostratigraphic references) but which also reflects, in so far as possible, the major changes affecting the Gondwana Realm and that of Angara at the same time. It was recognized that the equivalences can only be approximate and that one is looking for the biostratigraphic expression of a major world-wide event.

Another point conceded early in the debate was that regional chronostratigraphic classifications should be dealt with on a separate basis from the worldwide chronostratigraphic classification which provides the broad overall framework. The latter constitutes the most obvious task of the International Subcommission, whereas the former may be left to the appropriate groupings of Titular Members and their working groups.

The recommendations made by the mid-Carboniferous boundary committee chaired by Dr. Lane were summarized in three points which were subsequently refined and approved by the Titular Members present at the special meeting on Wednesday, 14 September.

The present recommendations are as follows:

1. That an international mid-Carboniferous boundary shall correspond approximately to the time of change from the Eumorphoceras to Homoceras ammonoid zones. Although the boundary is to be selected in the Eumorphoceras-Homoceras zonal transition, the known distribution of Homoceras is not a suitable taxon for worldwide recognition of a mid-Carboniferous boundary.

2. For this reason, another, more widely distributed group, the conodonts, can be utilized for recognition of that boundary. The conodont Gnathodus girtyi simplex Dunn gives rise to its successor Declinognathodus noduliferus (Ellison and Graves) at approximately the same stratigraphic level and occurs abundantly in the palaeoequatorial belt. It is recommended, therefore, that the stratigraphic level that marks the appearance of Declinognathodus noduliferus should be used in selecting a mid-Carboniferous boundary-stratotype. In parts of the Gondwana Realm, in the absence of Declinognathodus noduliferus, it appears that the

top of the range of Gnathodus girtyi simplex approximates that same level.

3. That the evolutionary appearance of other species, especially those from other fossil groups, be utilized as auxiliaries to recognize or approximate that boundary independent of D. noduliferus. Currently, these auxiliary species include the foraminifers Globivalvulina sp. D of Brenckle, 1973, Millerella pressa Thompson, and Millerella marblensis Thompson, and the conodonts Adetognathus lautus (Gunnell), Rhachistognathus primus Dunn and Rhachistognathus minutus (Higgins and Bouckaert). Other species also may be taken into account as their usefulness is demonstrated.

The proposal carried by a considerable majority, although I extended the deadline in order to accomodate a number of late votes. I have listed the votes individually below. In calculating the overall response (17 yes, 3 no, 3 abstain, 6 no response = abstain), I tallied a "yes" if 2 of the 3 points were favored, a "no" if 2 of the 3 points were rejected. Three formal abstentions were received, the other abstentions represent no response from that titular member.

Titular Member	Point 1	Point 2	Point 3	Recorded as
S. Archangelsky	abstain	abstain	yes	abstain
J. Doubinger	no resp	no resp	no resp	abstain
J.T. Dutro	yes	yes	yes	yes
O.L. Einor	yes	yes	abstain	yes
M. Gordon	abstain	abstain	abstain	abstain
A.D. Grigoryeva	no resp	no resp	no resp	abstain
Hongzun Guo	yes	yes	abstain	yes
R.M. Kosanke	yes	yes	abstain	yes
H.R. Lane	yes	yes	yes	yes
J.P. Laveine	yes	yes	yes	yes
Xingxue Li	yes	yes	yes	yes
G.A. Lianda	yes	yes	yes	yes
B.L. Mamet	no	no	no	no
W.L. Manger	yes	yes	yes	yes
S. Meyen	no	yes	abstain	abstain
M. Minato	yes	yes	yes	yes
E. Paproth	no	no	no	no
W.H.C. Ramsbottom	yes	yes	yes	yes
E.A. Reitlinger	no resp	no resp	no resp	abstain
J. Roberts	no	no	no	no
A.C. Rocha Campos	no resp	no resp	no resp	abstain
W.B. Saunders	yes	yes	yes	yes
M.N. Solovieva	no resp	no resp	no resp	abstain
P.K. Sutherland	yes	yes	yes	yes
R.H. Wagner	yes	yes	yes	yes
M. Weyant	yes	yes	yes	yes
C.F. Winkler Prins	yes	yes	yes	yes
Shipu Yang	yes	yes	yes	yes
Xilu Yang	no resp	no resp	no resp	abstain
TOTAL	17 yes 4 no 2 abstain 6 no resp	18 yes 3 no 2 abstain 6 no resp	15 yes 3 no 5 abstain 6 no resp	17 yes 3 no 9 abstain

As these results show, the proposal carried by a majority vote. I might add that a number of interesting points were raised, both pro- and con-. These are included in the following section. If any of you wish to make additional comments, please send them to the secretary or associate secretary. Those comments received by the secretariat prior to printing of this edition of the Newsletter are included in another section.

The immediate task now facing the Subcommission will be to refine the biostratigraphic data available in important reference sections, in order to proceed with review, evaluation and selection of potential stratotype sections. Dr. H.R. Lane, Chairman of the Stratotype Selection committee, is already active on this matter and should be able to report on progress in the forthcoming newsletter.

Regional Chronostratigraphic Units

During the meeting of the Titular Members it was decided that Regional Chronostratigraphic Classifications should be the responsibility of the regional Working Groups, in conjunction with the Executive Bureau of the Subcommission.

A meeting of the chairmen of working groups for the West and Central European region was convened subsequently to debate three submissions as follows:

B. Owens, N. Riley & M.A. Calver, Boundary stratotypes and new stage names for the early and middle Westphalian of northwest Europe.

R.H. Wagner, Proposal for a redefinition of the lower Cantabrian boundary-stratotype.

R.H. Wagner & C.F. Winkler Prins, Barruelian, new name for the Stephanian A.

This concerned the proposed stratotypes of three Westphalian stages (A, B and C) and the two lower stages of the Stephanian, as well as the formal naming of these stages in accordance with the recommendation made during the General Assembly at Krefeld, 1971 (see George and Wagner, 1972), to replace the informal connotations A, B, C and D by properly constructed stage names.

The first proposal was debated at length and a motion was approved without dissent to accept the boundary stratotypes in the East Pennine Coalfield of Great Britain for the base of the Westphalian A Stage, the base of the Westphalian B Stage and the base of the Westphalian C Stage as formal units in the locations indicated by Owens, Riley and Calver. The proposal for formal stage names was tabled and a decision deferred.

In the absence of time for further debate, the two proposals regarding the lower Stephanian stages were tabled for future reference.

The Carboniferous of the World

The first volume of the comprehensive work entitled 'The Carboniferous of the World' was published on 14 September 1983. This contains an authoritative synthesis of information on China, Korea, Japan and S.E. Asia, as prepared by Yang Shipu, Li Xingxue, Gao Lianda and numerous

co-authors for the Chinese area, Chang Hi Cheong for Korea, M. Minato for Japan, and I. Metcalfe for S.E. Asia. This is the first time that a comprehensive record of modern information on the Carboniferous of China appears in English. The Geological Society of China is thanked for coordinating the considerable effort that has gone into preparing this information which occupies 171 pages, including 21 plates illustrating a wide range of fossils. The contributions on Korea, Japan and S.E. Asia are also very significant, and the authors of all contributions are thanked for their effective cooperation in providing regional syntheses for the Carboniferous in East Asia.

The Subcommission also owes a large debt of gratitude to Dr. C. Martínez Díaz, the General Editor of the series on 'The Carboniferous of the World'. Dr. Martínez initiated the project and provided the link with the Insituto Geológico y Minero de España and the Empresa Nacional Adaro de Investigaciones Mineras, who are publishing the series under the auspices of the International Union of Geological Sciences. The first volume of the series is I.U.G.S. Publication No. 16.

It is noted, with profound gratitude, that most of the material for volumes II, III, and IV is already in the hands of the editors, Drs. R.H. Wagner, C.F. Winkler-Prins and L.F. Granados. The fact that this is so, shows that the international cooperation through the membership of the I.U.G.S. Sbucommission on Carboniferous Stratigraphy is functioning extremely well. The considerable effort made by the numerous contributors to 'The Carboniferous of the World' is gratefully acknowledged.

Field and General Meeting in Argentina, 1986

Dr. S. Archangelsky provided detailed information on the preparations for the Field and General Meeting to be held in Argentina, early in 1986, i.e. in the autumn of the Southern Hemisphere, when the climatic conditions are most suitable for field excursions. This is the first time that a Carboniferous field meeting will be held in the area of Gondwanaland, and the Subcommission is very grateful for the offer of hospitality extended by the Argentine authorities (CONICET and Academy of Sciences at Córdoba) and the opportunity this provides for its members to become acquainted with the stratigraphic problems peculiar to the Gondwana area. Appreciation is expressed to Dr. Archangelsky for the effective preliminary arrangements made and for the provisional programme which has excited considerable interest.

Working Group Reports

At the X-ICC Meeting in Madrid, the Subcommission adopted the following procedures to be followed by working group chairmen: "Brief written reports of working group activity will be solicted by the Secretary from the Titular Members for inclusion in the Newsletter each year. If a Titular Member fails to submit a report for two consecutive years, that person shall be deemed inactive; a new titular member may then be elected and the working group for that area reconstituted. This report requirement does not preclude publication of activity in other vehicles, the forum section of the Newsletter, or reports to the SCCS at any of its formal meetings."

Elections

As a result of a tie in the Chairman election held in 1980, Dr. R. H. Wagner and Dr. W. H. C. Ramsbottom agreed to serve a combined four-year term as Chairman and Vice-Chairman. Dr. Ramsbottom served as Chairman for the first two years (1981-1982) and Dr. Wagner has served as Chairman since. The term of Dr. Wagner as S.C.C.S. Chairman will offically expire with the International Geological Congress to be held in Moscow, August 4-14, 1984. The titular members were asked to nominate candidates for Chairman in late 1983. The nominees proposed by the titular members were: Dr. S. Archangelsky (Argentina), and Dr. Wagner and Dr. Ramsbottom (Great Britain) to serve another combined four-year term. While the election was underway, Dr. Archangelsky withdrew his candidacy because of the pressure of a new professional appointment; this request came too late to be announced to the titular membership and a new slate nominated. Based on the final polling of titular members, it appears that Drs. Wagner and Ramsbottom would have been elected, having received the majority of the votes at the time of Dr. Archangelsky's withdrawal. Thus, the new slate of officers for the SCCS is as follows:

Dr. R. H. Wagner, Chairman (1984-1986), Vice-Chairman (1986-1988)
Dr. W. H. C. Ramsbottom, Vice-Chairman (1984-1986), Chairman (1986-1988)
Dr. W. B. Saunders, Secretary (1982-1986)
Dr. W. L. Manger, Associate Secretary (1982-1986)

SCCS Expenditures (1983) and Budget Request (1984)

1.	Income, 1983		
	A. Balance carried over from 1982	$ 375.00	
	B. IUGS grant for 1983	700.00	
	Total Revenue		$1,075.00
2.	Expenses, 1983		
	A. Printing (newsletter, boundary proposal, misc)	$ 549.56	
	B. Postage (newsletter, boundary proposal, misc)	488.97	
	C. Secretarial (newsletter, boundary proposal, misc)	290.70	
	D. Misc. admin.	25.00	
	Total Expenditures, 1983		$1,354.23
	Over Expenditure		$ 311.25

3. Requested Budget, 1984

A. The expenses of producing and mailing newsletter and relevant proposals during 1983 exceeded the income by more than $300.; this was absorbed by the Secretary, Associate Secretary and Chairman. We anticipate similar expenses for 1984. Given our increased level of activity and considering the considerable effort SCCS will be undertaking in selecting a stratotype for a mid-Carboniferous boundary, we feel that our increased allocation for 1984 is warranted. Accordingly, we request the following for 1984:

1.	Newsletter production, mailing	$800.00
2.	Correspondence, proposals, production and mailing	300.00
3.	Secretarial Assistance	300.00
	Total, 1984, requested	$1,400.00

W. Bruce Saunders
Secretary, SCCS

- IN MEMORIUM

Members of SCCS will be saddened to learn of the passing of titular member Professor Masao Minato, Sapporo, Japan, who was killed accidently on April 14, 1984. He will be missed by his friends and colleagues.

SCCS
FIELD AND GENERAL MEETING
ARGENTINA, 1986

I would like to inform you about the steps that have been taken so far in relation to the next Field and General Meeting of the SCCS, to be held in Argentina in 1985/1986. A general outline was published in the last Newsletter on Carboniferous Stratigraphy (n 4 p. 24, 1983).

Organization - When the CONICET (Consejo Nacional de Investigaciones Científicas y Técnicas of Argentina) supported the meeting, the President of the Córdoba Academy of Sciences, Dr. Telasco G. Castellanos made a formal invitation. Sessions can take place in the Academy rooms with the help of its staff. During March this year a general meeting with the participation of 11 specialists was organized. I there explained the main objectives of the Field meeting obtaining a unanimous support of the group. About the date, it was agreed that the meeting should take place by April 1986 (Easter holidays): this is the best season to visit La Rioja and San Juan Provinces (October to March has rather uncomfortable hot weather).

Further contacts were established, from May to the present, with several institutions that offered help: Dirección Nacional de Geología y Minería, Yacimientos Petrolíferos Fiscales, Yacimientos Carbóniferos Fiscales and SOMISA (Steel Company). Academic institutions also expressed their support: Asociación Paleontológica Argentina, Asociación Geológica Argentina.

A first grant of US$ 200 to meet administrative expences during 1983 was allocated by CONICET.

Proposed Field Excursions - It is proposed to visit the Paganzo Basin, including sections in La Rioja, San Juan and Mendoza Provinces. The National Geological Service offered transportation for all participants, starting in Córdoba city with the last stop in Mendoza city. Two complementary excursions were eventually suggested, in case some members are interested and would like to stay longer. The first in Northern Argentina, Tarija Basin, where a Carboniferous section at Rio Bermajo is known (Macharetí and Mandiyuti Groups). This would demand 4 extra days. The second possible trip is to the Central Patagonian Basin, where Carboniferous marine sections of Tepuel Group can be visited, with fossil collecting. Also, transitional Carboniferous-Permian beds of the Rio Genoa Group can be visited (with collections of marine and continental fossils). This would demand 6 extra days.

A simultaneous special session of the IGCP Project "Palaeogeography and Tectonics of the Late Paleozoic in South America" will be held (pending the final approval by the IGCP Board, next February). Summary papers on the Carboniferous of South America could complete the information from Argentina.

A proposed general program follows, and during the preparation of the meeting, newsletters will be distributed among the Subcommission members.

I- Scientific meeting in Córdoba

In three (3) days, presentation of the following contributions:

a) Synthesis of the Paganzo Basin Carboniferous

b) Synthesis of the Central Patagonian Basin Carboniferous

c) Synthesis of the Tarija Basin Carboniferous

d) Synthesis of the Carboniferous-Permian boundary in the Paganzo, Central Patagonian, Chaco-Paraná, Buenos Aires and Colorado Basins

Each contribution will include the following chapters:

- Geological setting
- Main sections (some to be visited)
- Palaeontological content (incl. palaeoecology)
- Age and correlations
- Palaeogeography and Palaeoclimatology

After the presentations a general discussion will follow. If time allows, it is hoped that lectures on other aspects of the Southamerican Carboniferous will be given.

II- Proposed Field excursion to the Paganzo Basin

Days

0 Córdoba-Carlos Paz (end of sessions)

1 Bajo de Veliz, San Luis Province. Type section of the Bajo de Veliz Fm. (Historical locality, where a Glossopteris flora was discovered for the first time in S. America). Carboniferous-Permian boundary. Contains a flora with Gangamopteris, Sphenophyta, Cordaitales, Conifers, insects and large Arachnida. Lacustrine sequence. Back to Carlos Paz or La Falda (in Córdoba Prov.).

2 Anzulón section, La Rioja Province. Continental lowermost Permian sequence (fluviatile) with flora: Glossopteris, Phyllotheca, Botrychiopsis, Asterotheca, Ferugliocladus, etc. Palaeoecology. Olta Hotel, La Rioja.

3-4 Malanzán section, La Rioja Province. Continental middle Carboniferous sequence (lacustrine and fluviatile). Coal and flora with Botrychiopsis, Malanzania, Ginkgophyllum, Paulophyton, etc. Insects. Dropstones and turbidites. Palaeoecology. Olta Hotel, La Rioja.

5 Tupe section, La Rioja Province. Continental middle to late Carboniferous (Guandacol and Tupe Formations). Coal and the Nothorhacopteris argentinica flora (incl. Bergiopteris, Sphenophyta, etc.). Hotel at Jachal or Villa Unión.

6 La Rinconada section, San Juan Province. A classical locality visited by Alex du Toit. A sequence with glacigene sediments with a Nothorhacopteris argentinica flora. Evidences or recent tectonics. Hotel at San Juan.

7 San Juan river-Precordillera, San Juan Province. a) El Ratón Fm., with an Archaeosigillaria early Carboniferous flora; b) Hoyada Verde and Barreal Fms., marine and glacimarine sediments with fauna of the Levipustula levis zone. Hotel at San Juan.

8 Quebrada de la Herradura and Agua del Jaguel Fm. San Juan and Mendoza Provinces (incl. Uspallata). Marine mixed sediments with the Cancrinella zone fauna of early Permian age. A visit to the petrified forest visited by Ch. Darwin (Triassic) is also scheduled. Hotel at Mendoza.

9-10. Other sections in San Juan and Mendoza will be visited, separating the party according scientific interests: marine or continental. Ending in Mendoza, combination of flights with Córdoba or Buenos Aires for return.

During the excursions, several geological units apart Late Palaeozoic ones will be seen, specially Precambrian basements, marine Lower Palaeozoic, and continental Triassic (including pyroclastics).

III-Displays of Collections and Literature

- Córdoba University has the classical Kurtz Collection of fossil plants.
- Characteristic species of fossil plants and invertebrates will be brought from the Natural Museums of La Plata (Frenguelli coll.) and Buenos Aires (Feruglio coll.), CIRGEO (Buenos Aires), the Universities (Buenos Aires, Tucumán).
- Palynological slides of the main Carboniferous formations will be available for examination and discussion.
- The Academy of Sciences in Córdoba will display the main publications on the Argentine Carboniferous.
- Palaeontological and stratigraphical papers on the Argentine Late Palaeozoic will be available.
- The Atlas of Argentine Fossil Plants by F. Kurtz (1921) will be presented during the sessions, in its new, revised and completed version.
- An annotated bibliography of the Carboniferous in Argentina(including ca. 800 references) will be prepared.
- An illustrated Atlas of the Late Palaeozoic fossil plants will be presented.

Persons interested in participating in these field and general meetings should contact the secretary of SCCS, Dr. Saunders, as soon as possible.

RESPONSES TO MID-CARBONIFEROUS BOUNDARY PROPOSAL

MACKENZIE GORDON, JR. - UNITED STATES

When I telephoned you to record my abstention from the vote regarding the choice of the first appearance of the conodont Declinognathodus noduliferus (Ellison and Graves) to mark the Mid-Carboniferous boundary, I said that I would write you to explain my reasons for so doing. Briefly, it was because, at the time we were required to cast our votes, I felt the matter had not been sufficiently explored for us to come to an intelligent decision. We did not know how this level in the section relates to the first appearance of Rhachistognathus primus, Mamet Zone 20 foraminifers, or the brachiopod genus Rugoclostus, all of which have been used in the western United States to mark the base of the Pennsylvanian.

Such information was about to become available, based on the section that we have been studying at Granite Mountain in west-central Utah. As you know, we have made a series of collections, particularly for foraminifers, foot-by-foot through the lower 187 ft of the Ely Limestone at Granite Mountain. The critical part, including the Mississippian-Pennsylvanian boundary transition has been collected three times, the last time in October 1983, shortly after the close of the Tenth Carboniferous Congress. T.W. Henry, Bruce Wardlaw, Wayne Martin, and I spent a few days on Granite Mountain. Bruce took samples, averaging 25 lbs each, generally foot-by-foot, from 120 ft to 175 ft above the base of the Ely. Foraminifer samples and palynologic samples (for B. Owen) were taken from exactly the same foot-by-foot sequence as the conodont samples. The conodont samples, processed in Denver and studied in Washington by Wardlaw, have been completed, and Bruce is preparing a short paper on his results. We have not heard from Owen yet except to acknowledge receipt of the samples. Further study was done by Mamet on the foraminiferal assemblages and carbonate petrography, and Henry and I have conducted further work on the brachiopods. I now feel that we have sufficient evidence to assess the faunal changes that took place during the Mississippian-Pennsylvanian transition in this section. These faunal changes are recorded through 32 ft (9.7m) of section in the rapidly accumulated Ely sediments of the carbonate shelf in this area. All of our data point to a "continuously" deposited sequence of strata across this interval with no major changes in both litho- and biofacies. Here is the sequence of events as we have recorded it.

From 120 to 122 ft above the base of the Ely Limestone, the Adetognathus unicornis Conodont Zone is still recognized, along with Zone 19 (Eosigmoilina-Brenckleina Zone) foraminifers. In an overlying bed, from 122 to 123 ft, the first appearance of Rhachistognathus primus is recorded, still with Zone 19 foraminifers.

From 123 to 126 ft above the base of the Ely, in a bed of calcareous claystone and nodular limestone, Rugoclostus n. sp. A appears; this species may be limited to this one bed. The same unit also contains fairly common Rhipidomella nevadensis (Meek), in its final unquestionable appearance in this section. The other brachiopods from this unit are longer-ranging Chesterian types. So, here, we have a short overlap of the R. nevadensis and Rugoclostus brachiopod zones.

In an overlying bed 126 to 127 ft above the base of the Ely, we have identified R. nevadensis? and a Rugoclostus?.

The Rhachistognathus primus fauna and the Mamet Zone 19 foraminifers continue upward, together with some nondescript anthracospirifers. At 144 ft above the base of the Ely, the last Zone 19 microfauna is noted, characterized only by Eosigmoilina. As we emphasized in Madrid, the overlying next few samples (from 145 to 149 ft) contain abundant foraminifers, buy they do not contain the elements diagnostic of either Zones 19 or 20.

At 146 to 148 ft above the formation base is the first appearance of Rugoclostus n. sp. B, together with an undescribed, narrow Anthracospirifer that we have encountered with other "Pennsylvanian" brachiopods in the Schell Creek Range. In eastern Nevada, the Schell Creek Range is two mountain ranges west of Granite Mountain and was mapped in the 1950's.

At 147 to 148 ft, Mamet recorded a questionable Zone 20 sample, containing what he regards as a primitive Millerella. This is just below the lowest chert-bearing bed in the Ely Limestone, used by many of the mappers in this region as the approximate base of the Pennsylvanian.

At 150 to 151 ft, an indisputable Millerella marbleensis (Thompson, emend. Armstrong and Mamet) and the lowest Declinognathodus noduliferus (Ellison and Graves) both are recorded. Other diagnostic Zone 20 (Millerella-Globivalvulina Zone) microfaunal components follow in succeeding samples.

At 151 to 152 ft above the base, Rugoclostus n. sp. B is present, along with the first appearance of Echinoconchus n. sp. A, both characteristic species of the Early Pennsylvanian brachiopod fauna. A large Derbyia? is also present here.

In a shaly limestone bed 153.3 to 154.3 ft above the base of the Ely, all of the elements of the Early Pennsylvanian brachiopod fauna appear to be in place--Rugoclostus n. sp. B, Rugoclostus n. sp. C, Antiquatonia n. sp. cf. A. coloradoensis (Girty), Linoproductus n. sp. A, and Anthracospirifer occiduus (Sadlick). The transition is complete.

In summary, the changes from the Mississippian to the Pennsylvanian faunas occur one by one over a 32-ft interval at Granite Mountain. Some geologists might argue that the base of the Pennsylvanian should approximate the base of Rugoclostus n. sp. A and Rhachistognathus primus, as some workers have used these in the past. However, the fact that Millerella marbleensis (one of the Zone 20 indices) and Declinognathodus noduliferus first appear in the same 1-ft-thick interval makes a stronger case for locating the boundary 150 ft above the base of the Ely in this section. Thus, most of the "transitional beds" would be assigned to the latest Mississippian. Henry, Wardlaw, and I all agree on this point, and I suspect that Mamet would also (although I certainly would not presume to commit him to this in this letter).

Placing the boundary at this level would at least involve evidence from three major biotic groups (foraminifers, brachiopods, and conodonts), rather than relying solely on one form-species--which is my major objection to the proposal as it is written.

Frankly, I still think that voting on a boundary at this time is premature. A number of problems still need to be investigated, particularly in nearby sections in the Confusion Range, to secure more information on

the conodonts and foraminifers in relation to the brachiopods. In other words, these relationship of biotic first-and-last occurrences should be verified over a wider area before the rocks are violated by a golden spike!

Furthermore, I don't believe that it has been demonstrated satisfactorily that the first appearance of Declinognathodus noduliferus coincides with the base of the Homoceras Zone. I hope that more sections can be worked in the detail with which we have studied the Granite Mountain section.

O. L. EINOR - SOVIET UNION

Since I was not at the SCCS meetings in Leeds and Madrid, it was extremely difficult for me to take part in the vote on the question of an International Mid-Carboniferous boundary. Earlier I repeatedly spoke out in favor of a boundary at the level of the base of goniatite zone R_1 (Bouroz and Einor, 1977, 1978; Einor, et al. 1979; Einor and Rumyantzeva, 1982). It is most apparent that a more or less sharp break in the development of a series of marine faunal groups is manifested almost synchronously at the boundary of the E_2 and H goniatite zones, and over the duration of the H zone. It is quite precisely at the lower boundary (E_2 and H) in the development of forams (according to N. Brazhnikova, 1954, later according to E. Reitlinger, G. Kireev, Z. Rumyantzeva and others), conodonts (T. Nemirovskaya), ammonoids (V. Ruzhentzev and M. Bogoslovskaya), corals according to observations in the Donbass (N. Vasiluk). Many brachiopods (species and genera) experience extinction over the duration of the Homoceras Zone. Important new groups (Choristites or Parachoristites, Neochonetes and others) appear primarily at the boundary of H and R zones. As a whole, the boundary in organic development at the base of the Homoceras zone appears to be the most significant. In carbonate facies, the Homoceras Zone acquires its character from foraminifera. In the Donbass, the Urals, Tyan-Shan, in each of these regions there is only a single section confirming forams with ammonoids. N. Brazhnikova (Donbass), E. Reitlinger (Urals), Z. Rumyantzeva (Tyan-Shan) consider it possible, although with difficulty, to distinguish complexes "H" (related among themselves) from adjacent ones, both older and younger ones. Poor conodont complexes, showing up in all three sections, are not obviously distinguishable from Syuranskian (that is R_1). Thus, in almost all sections which reveal contiguous sequences of Lower and Middle Carboniferous strata (for example, in the Urals there are many tens of such regions and sections over an extent of 2,000 kilometers) the establishment of the base of the Homoceras Zone is possible only very provisionally and even conditionally. Great difficulties in the practical detection of an upper boundary for the Lower Carboniferous (at the base of H) in many regions and in association with widely expressed uplifts (positive areas) during the time corresponding to Zone H (and even earlier). Thus, for example, Zone H has never been detected anywhere on the Eastern-European (Russian) platform. The platform was positive. Sedimentation began (east of the Volga River) at the time of R_1 (Krasnaya Polyana Horizon).

On the other hand, R_1 Zone (Syuran) was distributed very widely and easily distinguished paleontologically (by forams and brachiopods, groups with the widest distribution, ammonoids, conodonts and corals). Here, this boundary was accepted by the plenum of the Carboniferous Commission and Stratigraphical Boundary Committee in 1974. In the past years, it has not been revised in the Soviet Union. Instead, in Soviet and world stratigraphy, views of the primacy of biostratigraphic criteria for the separation of planetary units (Systems, Series, Stages), and boundaries hold sway. Arising from these principles and by the majority of groups of organic remains of the highest rank (Types, Classes) in particular, "Archistratigraphic", the most basically examined boundary is at the base of the H Zone (Superzone).

JOHN ROBERTS - AUSTRALIA

On my return from Madrid I wrote to the few colleagues who are actively working on Carboniferous faunas, and who were unable to be at the Congress, for their views on the new recommendations for the position of the Middle Carboniferous boundary. Copies of two of the more detailed replies from Peter Jones and Bob Nicoll, and Huw Jenkins are enclosed.

Ken Campbell has no strong feeling for the situation of the boundary in the northern hemisphere, but considered the lower boundary of the Namurian would be the most reasonable international boundary. Arthur Mory also thought that the Visean-Namurian boundary would be much more acceptable than the E-H level, but recognized that there were problems with the conodonts at the Visean-Namurian boundary because of provinciality. He thought that Mamet's foram zones could be used to provide an internationally recognizable Visean-Namurian boundary.

Brian Engel (who attended the Congress) and I still contend that so far as Australia is concerned the Visean-Namurian boundary is far more recognizable than the E-H and any boundary drawn at that level on correlation charts will be based on conodonts from one locality and therefore would be unusable. The situation is further compounded by the lack of diversity within and impossibility of subdivision of the Levipustula levis Zone, and the fact that there is only one region (Yarrol Orogen in Queensland) where there is an apparently continuous marine sequence from Namurian to Permian. The best we will be able to do in eastern Australia is to infer the E-H boundary somewhere in the L. levis Zone; in Western Australia offshore drilling may help to delineate a more recognizable boundary in the future but none is determinable at present.

T. B. H. JENKINS - AUSTRALIA

Regarding the recommendation to the Carboniferous Congress Stratigraphic Subcommission on the positioning of the Lower/Middle Carboniferous boundary. My comments follow:

1. At the present state of knowledge of the Australian Carboniferous no compelling need to recognize such a boundary seems to have emerged here. But if such is to be recognized through the northern continents we will be obliged to place it somehow in our sequences. I agree therefore with your reservations to the original proposal based, as I understand it, on recognizing the Eumorphoceras/Homoceras zonal boundary worldwide on changes in ammonoid faunas which are unrepresented in Australia.

2. The alternative of using conodonts to recognize a Lower/Middle boundary at approximately the same horizon is at first sight reasonable but encounters difficulties in its application:

(a) Good conodont faunas are very rare at the levels in question in eastern Australia. None are known to me from Queensland, those of Palmieri (1969) being discernibly younger, at least in large part; they are also difficult or impossible to relate lithostratigraphically or biostratigraphically to the better known sequences of the Yarrol Trough.
(b) Use of the subspecies simplex of Gnathodus girtyi implies acceptance of the detailed taxonomy relating to that species. I agree with Metcalfe's (1981, p. 25) comments which I quote "G. girtyi has been sub-speciated by many previous authors and the ranges of the various sub-species appear to be anomalous from area to area. This species has not been subdivided in the present work because it is felt that detailed biometrical work is required before a satisfactory subdivision can be made. Material: 691 specimens".
(c) Among forms recorded as Gnathodus girtyi simplex by Crane (1975) there are specimens which appear to belong elsewhere, on the existing (unsatisfactory) taxonomic criteria.

3. On balance I would prefer the Visean/Namurian boundary to represent the Lower/Middle horizon in Australia, on the grounds that higher faunas tend to deteriorate, especially in their intercontinentally correlatable elements. I would therefore support your suggestion to that end but feel its merits lie in observed faunal sequences rather than in 'events' or other explanations.

P. J. JONES and R. S. NICOLL - AUSTRALIA

1. We agree with the ancestor-descendant relationships that are implied in the Gnathodus girtyi simplex - Declinognathodus noduliferus lineage, and that this evolutionary sequence occurs widely in the palaeo-equatorial belt.

2. We know of no evidence that can be used as an argument against the recommendation that the mid-Carboniferous boundary should be defined on the appearance of Declinognathodus noduliferus for the palaeo-equatorial belt.

3. We point out that the only published report of a mid-Carboniferous conodont fauna in Australia is that of Palmieri (1969), who described a poorly preserved conodont fauna from limestones exposed in a faulted block, near Murgon, Queensland. The limestones represent only a small part of the Carboniferous sequence, and their stratigraphical relations are unknown. Thus, this fauna is of limited stratigraphical value, and there are no other faunas known by which the mid-Carboniferous boundary, as defined by the appearance of Declinognathodus noduliferus, can be recognized in Australia, or in any other part of Gondwana.

4. We agree that in Australia, and other parts of Gondwana, the upper limit of the range of Gnathodus girtyi simplex may be of assistance in the recognition of the mid-Carboniferous (Mississippian-Pennsylvanian) boundary, as defined by the appearance of Declinognathodus noduliferus.

5. On the other hand, the Dinantian-Silesian boundary is more readily recognizable in Australia (Jones et al, 1973; Druce & Jones 1974; Jones & Roberts 1976) on the basis of several groups of marine invertebrates i.e., ammonoids (Campbell et al, 1983); brachiopods (Roberts 1975; Roberts et al, 1976) and foraminifers (Mamet & Belford 1968; Jones & Roberts 1976) and at present serves as a useful mid-Carboniferous boundary.

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SCCS WORKING GROUP PROGRESS REPORTS

LOWER CARBONIFEROUS OF CHINA WORKING GROUP (Yang Shipu)

Annual report of Lower Carboniferous working group of China. The status of working group: Yang Shipu (Brachiopods and paeoecology), Yang Guansiu (paleobotany), Yang Fengqin (Ammonoids) and Fan Yingnian, Wang Zhiping (corals).

Current and planned activities: In 1983-1986 years 3 projections established by working group:

1. The Mid-Carboniferous boundary of Kiechow and Kansu (mainly based on Ammonoids, Brachiopods, conodonts and plants). In 1983 finished field works in western Kiechow.

2. Stratigraphy and fauna of Xizang (Tibet). Publications: 1982 Yang Shipu and Fan Yinnian - Carboniferous strata and fauna in Shenzha district, northern Xizang (Tibet). "Contribution to the geology of the Qinghai-Xizang (Tibet) plateau". vol. 10, pp 44-64. 1983 Yang Shipu and Fan Yingnian - Carboniferous brachiopods from Xizang (Tibet) and their faunal provinces. "Contribution to the geology of the Qinghai-Xizang (Tibet) plateau." vol. II, pp. 265-289.

3. Carboniferous trace fossils and paleoecology of China. (Including Lower Carboniferous paeoecology and trace fossils from south-eastern Kiechow and the Carboniferous Zoophycos from China).

In September 1983 a meeting on Carboniferous stratigraphy of all China was held in Kieyang, Kiechow province. In September or October 1984 we are planning a meeting on Carboniferous and Permian coal-bearing strata in Teiyuan province Shansi.

REPORT OF THE CHAIRMAN OF THE USSR WORKING GROUP ON THE LOWER CARBONIFEROUS

E.A. REITLINGER

The Soviet specialists dealing with the Lower Carboniferous deal with the latter as a series within a generally accepted three-fold subdivision of the Carboniferous; this is the first major interval in the large evolutionary period in the development of the organic kingdom typical for the Carboniferous as a whole.

The Lower Carboniferous is meant to comprise three stages - Tournaisian, Visean and Serpukhovian - which correspond to successive stages in the geological history. The introduction of new stages, as proposed by West European specialists within the Tournaisian and Visean units in their traditional acceptance is regarded by us as premature since the boundaries of these new stages cannot be correlated adequately over a sufficiently large area, and since they lack definite creiteria for consideration as stage subdivisions. At present the detailed subdivision of the Lower Carboniferous as well as that of the other series goes in the direction of developing a zonal subdivision. The proposed new stages are considered to rank as regional stages (regiostages); on a whole, they correspond approximately to the substages of the General Carboniferous Sclae as adopted in the USSR. In the USSR it is recommended to use two parallel scales for the Lower Carboniferous, viz. a - cephalopod and foraminiferal scale. Correspondingly, the Tournaisian stage is subdivided into respectively three and four zones, the Visean Stage - into three and five zones, and the Serpukhovian stage - into three and three zones. These zones reflect definite intervals in geological history and evolutionary successions in the development of faunal assemblages.

It should be noted that the contents of Tournaisian and Visean in the USSR do not correspond entirely to those in Western Europe. Such a situation requires undoubtedly a unification. For instance, the Wocklumeria zone within parallel zone of Q. kobeitusana , which is included with the Carboniferous in the USSR, is assigned to the Devonian internationally; the lower foraminiferal zone of the Visean Stage, viz. the E. elegia, E. diversa and Tetrataxis Zone (possibly analogous to the conodont zone Scaliognathus anchoralis) in the Franco-Belgian Classification has among other things, also a Tournaisian age. The boundaries of the Lower Carboniferous and its stages adopted in the Carboniferous Scale functioning in the USSR are disputable. Soviet specialists in their opinion on their definition:

1. In the USSR, the Devonian-Carboniferous boundary has been studied by special group (SWG), which worked within the framework of a general plan by the International Working Group (IWG) with the aim to establish a single, correlatable boundary. This work aimed at studying the boundary deposits in detail and to search for a succession with the most complete (continuous) sedimentation in order to select a boundary stratotype. Much consideration has been given to the sequences containing the fauna and flora which is most widely used for interregional and intercontinental correlation, e.g. ammonoids, conodonts,

foraminifera and miospores. Additionally, attention has been given to ostracods since the Soviet specialists have revealed their significance for a detailed subdivision and correlation of sequences.

The SWG studied two alternative boundaries, via. a lower, one as currently adopted in the USSR, at the base of the foraminiferal zone of Q. kobeitusana and a higher boundary as proposed by the IWC and which may be drawn at the incoming of Siphonodella sulcata. These two horizons were considered from a position of comparative estimation of their most distinct recognition and widespread correlation by other groups of organisms.

The working group has studied a number of outcrops in the South and North Urals and in West Kazakhstan (in the area of Mugodzhary) where cephalopod find have been made earlier, often in conjunction with other faunal remains. Borehole successions in the central part of the Russian Platform, the Volga-Urals province, the Donbass, and Fore-Timan area were used as reference sections.

Of particular interest were two heterofacies types of successions in the area of Mugodzhary showing relatively deep-sea and shallow-water conditions of sedimentation. In the latter type, the studies discovered an acutimitocerasic fauna close to that of the Stockum sequence in the Rhenish Schiefergebirge where it underlies the G. subinvoluta Zone. In the layers containing this fauna in the Mugodzhary province conodonts were found such as - S. sulcata. The SWG means to propose this sequence (with some supplements) as a candidate for establishing the Devonian-Carboniferous boundary-stratotype.

A number of sequences of the North-East of the USSR (in the Omolon Massif) are also of great interest. This region is supposed to have one of the most complete sequences but so far the specific character of its fauna has interfered with a reliable wide correlation of detailed subdivisions. At present this succession is studied by a team of Soviet and Belgian specialists.

On a whole the fauna and micro-flora in the USSR have been studied unevenly. Partially this results from the variety of facies Microflora is practically unknown in the key sequences of Devonian - Carboniferous boundary deposits in the Urals and in the Mugodzhary province; in the Omolon province it has only been defined in a single sample. On the other hand, on the Russian platform (mainly in boreholes) in sequences which are poorly characterized by faunas the palynological studies revealed detailed zonal assemblages of miospores (the Volga-Urals province and Pripyat region) which are reasonably comparable to those known on West European territory, i.e. the possible analogues of the palinozones LL, LE, LN and VI.

Soviet specialist have not yet developed a unified opinion with respect to a definition of the Devonian-Carboniferous boundary. Both boundaries considered have their particular shortcomings for a broad correlation with different groups of organisms. The lower limit of the index-zone of Q. kobeitusana lies on conodonts between the P. styriacus Zone (reliably regarded as Devonian) and the lower to middle part of the B. costatus Zone and is found in the lower part of zones on ostracods and miospores. The level at which the first S. sulcata appears has not been defined reliably in respect to other faunal groups; at present, it seems to appear at a lower horizon than corresponds to the earlier proposal (i.e. within the zone of A. cutimitoceras in the Mugodzhary province).

The materials published in a form of single reprints were distributed among members of groups and persons concerned.

On the basis of the results obtained, the SWG considers it premature to renounce the cephalopod scale as the basic one, because the newly proposed levels on the basis of foraminifera and conodonts do not show particular advantages over it; simultaneously the group recommends to pay more attention to the level of appearance of the Acutimitoceras fauna which marks on the whole, an essential reconstruction of faunal and microfaunal assemblages; the changes possibly date back to the end of the Wocklumeria Zone.

2. The definition of the Tournaisian-Visean boundary in the USSR has been the responsibility of a special working group headed by M.V. Vdovenko (its report on this subject is available); this boundary is also debatable and three variants of its position have been proposed. The first two are related to the inclusion of the boundary foraminiferal zone of S. elegia - E. diversa - Tetrataxis (the possible analogue of the conodont zone of Scaliognathus anchoralis) into either the Visean or the Tournasian ; the appearance of a number of Visean faunal elements (such as ostracods, brachiopods, etc.) in this zone has permitted the inclusion of this zone in the Visean Stage as defined in the USSR Stratigraphical Scale. Taking account of the geological history over the last few years, the specialists have put forward a third variant of the Tournaisian-Visean boundary position - inside the Elkhovsky (Kosvinsky) horizon with subdividing the above-mentioned foraminiferal zone (corresponding to this transitional horizon) into two parts, lower - with predominance of Touranaisian elements and upper - Visean.

3. It is worthy of note that the Visean-Serpukhovian boundary is not defined unambigously by different groups of fauna. On the cephalopods and conodonts it is supposed to be drawn lower than is currently adopted on foraminifera in the 1982 classification.

In the opinion of a majority of specialists dealing with Carboniferous deposits, the upper boundary should be drawn at the top of the Serpukhovian Stage since this makes a final stage in the development of organisms typical for the Lower Carboniferous Epoch. The problem of the stratigraphic position of the Homoceras Zone within which there is a considerable reconstruction of assemblages belonging to different groups of organisms, remains debatable. We must emphasize that the latter zone has not yet been studied widely and deeply enough and that it has not been correlated reliably enough even on the regional scale not speaking about interregional scale. Conodonts are so far the most important for its definition. Further development of Lower Carboniferous stratigraphy should go in direction of concretization and correlation of zonal schemes by different groups of fauna. Herewith the problem of interregional and intercontinental standard correlation can be reliably solved only by mutual concrete studies of fauna and microflora (in some cases discussions result from different understanding the volumes of the species, important in respect of stratigraphy).

NORTH AFRICAN WORKING GROUP (Marcel Weyant)

There is no formal North African working group entrusted by the SCCS with any particular stratigraphical purpose. Therefore this report is merely a general account of current work on the Carboniferous of this area.

The following people have their main interest devoted to the Carboniferous of Central and Northwest Sahara: Jacqueline Conrad (Université Saint-Jérôme, Marseilles), Marie Legrand-Blain (Université de Pau), Maurice Lys (Université de Paris-Sud, Orsay), Claude Pareyn (Université de Caen), Marcel Weyant (Université de Caen).

The most important work during the past months was achieved by Jacqueline Conrad on the Carboniferous series of Central Sahara. She gives a synthesis of stratigraphy, sedimentation, paleogeography, and structural evolution of the cratonic area northwest of the Targui (Hoggar) shield, where three main cycles (Strunian-Tournaisian, Visean, and Moscovian) are distinguished. Detailed paleontological investigations based upon several fossil groups provide a reliable chronological background to an attempt of a general paleodynamic reconstruction of this large African area.

At the instigation of Claude Pareyn, new topics within the Bechar basin are being taken up by Algerian workers: sedimentology of the Upper Carboniferous carbonates, evolution of the reef structures bordering the Grand Erg Occidental (M. Setra, Oran).

Several paleontological monographs are currently in progress, the general aim of them being to provide detailed comparative range data from various groups of fossils.

Maurice Lys continues his investigations on foraminifers, especially near the presumed mid-Carboniferous boundary in the Béchar area. He also supervises, together with Claude Pareyn, micropaleontological studies on the Visean from Bechar initiated by Miss Amina Sebbar (Algiers).

Pierre Semenoff-Tian-Chansky is working on Dinantian and Serpukhovian solitary and compound rugose corals from the northern flank of the Tindouf basin.

Marie Legrand-Blain completed her comprehensive study on giganto-productids from Algerian Sahara with Namurian representatives of this group. One particular point of this study is the localization of the ultimate gigantoproductids some 15m below the first appearance of Declinognathodus noduliferus in the Béchar basin. Marie Lagrand-Blain is now working on Upper Viséan to Bashkirian spiriferids and the relationship between brachiopod associations and sedimentary facies.

Marcel Weyant prepares a detailed review of Tournaisian through Msocovian conodonts from several Saharian areas (Béchar, Timimoun, Reggan, Ahnet, Mouydir, Illizi).

REPORT BY THE WORKING GROUP CHAIRMEN: O.L. EINOR, M.N. SOLOVIEVA, AND A.D. GRIGORIEVA

SERPUKHOVIAN, BASHKIRIAN, MOSCOVIAN, KASIMOVIAN GZHELIAN STAGES IN THE USSR

O.L. Einor: The review on the stratigraphy of Serpukhovian and Bashkirian stages within the framework of the whole Carboniferous system is given in "Carboniferous of the World." The Serpukhovian and Bashkirian are distributed throughout the whole USSR territory. They are found in the following geosyncline areas - Donbass, Skifia, Turan (?), Urals-Tien-Shan, Kazakhstan, Taimyr, Mongolo-Okhotia Sikhote - Alin, Verkhoyansk-Kolyma. In the above-mentioned regions the Tournaisian-Serpukhovian and in majority of them the Bashkirian are represented by marine deposits. Tourniasian-Serpukhovian marine interval is well expressed also on the Preriphean Russian plate. The Bashkirian (as well as higher Carboniferous stages) are well developed in the eastern part of the plate. On the Siberian platform and in the regions of Caledonian and Early Variscan cratonization/Altai, Northern Tien-Shan, etc. these stages comprise continental deposits. During the past years after the VIII-th Congress, 1975, the Soviet side continued stratigraphical studies of Serpukhovian and Bashkirian stages in all regions and in many of them, also lithological and paleontological studies. The most detailed studies were undertaken in the Donetz and Dniepr-Donetz basins. They resulted in publication of the monograph on detail stratigraphy and paleontology of Upper Serpukhovian substage in Donbass with description of algae (O. Berchenko), foraminifera (N. Brazhnikova and M. Vdovenko), brachiopods (D. Aizenverg, V. Poletaev), conodonts (T. Nemirovskaya). All together - more than 400 species (part of them newly described).

These studies identified the Zapaltyubinsky, zone E_2 and Voznesensky, zone H horizons. They do not have analogues in the sequences of Moscow syneclise due to stratigraphic gaps which to the west of Volga river affected also Bashkirian stage.

On the Russian plate the facies and paleogeographical studies are carried out by A. Osipova, T. Belskaya, detail stratigraphical studies, M. Makhlina, V. Zhulitova, V. Gubareva, A. Yu Kuznetsov and others.

Bore holes drilled in several structures of the Valyne-Urals province the studies revealed horizons included in the Unified Scheme of subdivision of Serpukhovian and Bashkirian stages (from Tarussky up to Melekessky Horizon) as well as all foraminiferal zones of the USSR General Carboniferous Scale.

Similar works are in progress in the Novaya Zemlya-Urals province. The widest volume of stratigrapho-paleontological works was made in western geosyncline zones (by N. Kalashnikov - from Novaya Zemlya up to the North Urals, he also described brachiopods; A. Nikolaev - foraminifera; O. Shcherbakov et al - stratigraphy and paleotectonics of the Central Urals Carboniferous; M. Postoyalko - stratigraphy and fauna of foraminifera).

The Bashkirian stage stratotype (Askyn river sequence) received new description of its horizons, zones, by conodonts - T. Nemirovskaya; and corals - V. Ogar. The Paleontological Atlas of the stage stratotype is under publication (Z.A. Sinitsyna).

On the East Urals, (eugeosyncline) by foraminifera (R. Ivanova, N. Malakhova), partially by very rare goniatites (M. Bogoslovskaya), ostracods (N. Kochetkova), brachiopods (Ya. Lutfullin) were established all horizon and zones from the United Scheme of the Urals Stratigraphy. They are correlated with the USSR General Scheme.

In East Kazakhstan (to the north of the Tien-Shan system) the studies discovered one of the most complete and rich in fauna sequence of Serpukhovian-Lower Bashkirian (?), along the Boeleuta river (tributary of the Sary-Su river) on southern margin of the Ulu-Tau mountains. Its studies are at final stage (stratigraphy, brachiopods by N. Litvinovich, conodonts - by V. Vorontsova, foraminifera - by E. Reitlinger, cephalopods - by M. Bogoslovskaya et al.).

New data on stratigraphy and paleontology of Serpukhovian and Bashkirian stages were obtained in the Tien-Shan and Darvaz provinces. There we continue studying foraminifera (M. Marfenkova, Z. Rumyantseva, A. Dzhenchuraeva, L. Ektova, M. Solovieva), brachiopods (O. Sergunkova, A. Galitskaya, Z. Tyulyandina, O. Zhizhlo), conodonts (T. Iskanderkhodzhaev). Supplementary and special studies are continued in the USSR eastern provinces.

M.N. Solovieva: Moscovian deposits are widespread over the USSR territory in tropical and boreal palaeoclimatic belts and are represented by platform, miogeosynclinal and eugeosynclinal facies. Facial and stratigraphic completeness of the stage sequences varies from one region to another and therefore the subdivision and correlation of these deposits on vast territories are very complex.

Many teams of geologists, paleontologists and stratigraphers work in different region of the USSR, occupied by these deposits. Their labour provide in principle rather high level of their knowledge. The results obtained by some specialists was a subject of discussion at the Meeting on Problems of Carboniferous Stratigraphy held on the initiative of the Leader of Working Group. It was attended by more than 300 scientists from 24 cities of the USSR, who had delivered and discussed 34 reports.

Since the last International Congress in connection with preparing the publication of "The Carboniferous of the World" (C. Martinez Diaz, R.H. Wagner, C.F. Winkler Prins, Editors) we published a summary on Moscovian stage deposits on the East European platform (M.N. Solovieva, V.S. Gubareva, E.A. Ivanova, O.P. Fisunenko, O.A. Shcherbakov, O.L. Einor).

For the past period, the USSR introduced into operation the USSR General Carboniferous Scale. Its chapter on Moscovian stage is based on the studies of ammonoids by V.F. Ruzhentsev, M.F. Bogoslovskaya, A.V. Popov and on Common Zonal Scale compiled in 1977 by M.N. Solovieva on the basis of foraminifera. In 1979 A.V. Popov published the monograph on Donbass ammonoids and in 1983 was completed compilation of summary on biostratigraphy of Late Paleozoic ammonoids.

For the same period, M.N. Solovieva carried out restudying the stratotypes, and as a result established in the normal succession of the standard sequence the presence of Tsninsky horizon omitted in the stratotype, corrected the volumes of interstage subdivisions and proposed new scheme of zonal subdivision. On this basis were proposed a new model of correlation. Based on the data obtained during restudying the stratotypes and with account for the data by E.M. Shik, E.N. Genista and others we received new, including also palynological materials for

defining the level of Moscovian stage lower boundary. Herewith these materials confirmed the earlier expressed viewpoint on the necessity of its descending compared to its level adopted nowadays for correlation with West European Scale (R.H. Wagner - Great Britain, A.V. Popov, O.P. Fisunenko, V.I. Poletaev, E.M. Shik, M.N. Solovieva - USSR). The Working Group came to a conclusion that the problem of lower boundary had to be studied in the nearest future and the results of these studies should be submitted for consideration of the XI-th International Congress on Carboniferous Stratigraphy and Geology.

In the central regions of Moscow syneclise the studies were performed by E.A. Ivanova, M. K. Makhlina, E.M. Shik, V.E. Zhulitova, A.M. Kulikova, T.A. Nikitina, S.S. Lazarev, M.N. Solovieva and other scientists. They dealt with conodonts and with refining the earlier proposed variant of conodont zonal scale (I.S. Barskov, A.S. Alekseev, N.V. Goreva). In the Volga-Urals province, the team of scientists working in different parts of this region obtained rather interesting data (Y.I. Kuznetsov, E.N. Semikhatov, B.S. Gubareva, I.I. Dalmatskaya, E.I. Korotkova, I.A. Chernova, G.P. Zolotukhina and other scientists). Biostratigraphy and fauna of northern part of the Russian plate, North and Polar Urals, Arctic were studied by N.V. Kalashnikov, A.N. Sultanaev, A.I. Nikolaev, N.N. Lapina, V.A. Chermnykh, N.V. Enokyan, L.N. Belyakov, A.I. Eliseev, N.V. Goreva, G.E. Chernyak, M.F. Solovieva, M.N. Solovieva and others. The scientists of the Urals province made a revision of huge materials and introduced new material in connection with the revision of the Stratigraphical Schemes of the Urals, published in 1980 (N.P. Malakhova, V.V. Devingtal, V.P. Zolotova, R.A. Lyadova, O.A. Shcherbakov, M.V. Shcherbakova, G.V. Dyupina, A.N. Kolchina, N.N. Kochetkova, Ya. L. Lutfullin, B.I. Chuvashov, R.M. Ivanova and others). During the same period, we published Atlas of Middle-Late Carboniferous Fauna and Flora of Bashkiria (1979) and Paleontological Atlas of the Urals (1979).

On the USSR Far East the Moscovian stage was studied by M.I. Sosnina, A.P. Nikitina and in the USSR North-East - by V.A. Ganelin, B.S. Abramov, A.D. Grigorieva and other scientists.

In Donbass the stratigraphy, fauna and flora of Moscovian stage were studied by V.K. Teteryuk, N.P. Vasilyuk, V.I. Poletaev, V.A. Pogrebnyak, R.I. Kozitskaya, M.T. Sergeeva and other scientists. Of particular importance was elaboration of zonal scales by leaf flora made by O.P. Fisunenko. Moscovian stage in the Fore-Caspean syneclise was studied by V.S. Gubareva, I.I. Dalmatskaya, M.N. Izotova. The studies of biostratigraphy and separate groups of fauna and flora in the USSR Central Asia were also continued (A.V. Dzhenchuraeva, Z.S. Rumyantseva, L.I. Savitskaya, V.D. Saltovskaya, M.N. Solovieva).

A.D. Grigorieva: For the period between 1979 and 1983 the USSR Working group on Upper Carboniferous in principle preserved its old membership; except G.M. Yarikov who left the group and inclusion of T.N. Isakova (Geological Institute of the USSR Academy of Sciences, a specialist on fusulinids).

The main work was concentrated around organization and holding a Plenary Session of the ICC Carboniferous Commission on the subject "Upper Carboniferous of Carboniferous System". It was held on 11-16 September, 1981 in Shakhty, Rostov's province was attended by 57 persons from 20 cities and 33 representatives of the USSR Institutions

who heard 41 reports. Its subject can be subdivided into three problems: 1. Characteristics of stratotypes and key sequences in different regions of the USSR; 2. Description of different groups of fossils typical for Upper Carboniferous deposits; 3. Stage and zonal subdivision of the Upper Carboniferous on the USSR territory, position of boundaries of different Upper Carboniferous subdivisions.

After considering the actual materials available on many sequences of the Russian European area and Central Asia, the plenary session proposed the stratotypes of stage boundaries and Upper Carboniferous zones: a) lower boundary of the stage - sequence in the Domodedovo quarry or Hole 6 - Felisovo, hypostratotype - the Afanesevo, Myachkovo, Volodarsk quarries, in addition it was recommended to select a hypostratotype of the lower boundary in the Donbass; b) variance supplimentary stratotype for the Carboniferous upper boundary in the Oca-Tsna rampart (Redorovo quarry), Samara meander (Ablonevo ravine), the South Urals (Nikolskoe, Aidaralashi); c) possible neostratotype of the Kasimovian stage - the Afanasievo quarry, quarries of Oka-Tsna rampart (Shcherbatovka et al). Sequenece of Hole 6k near Gzhel was recommended as a key sequence; d) stratotype of Kasimovian-Gzhelian boundary - the Dyukino quarry of the Oka-Tsna rampart, the Kalinovsk key sequence in Donbass and Gzhel region where it was recommended to drill several shallow holes of large diameter; e) neostratotype of Gzhelian stage - series of quarries of the Oka-Tsna rampart - Georgievo, Debryatin, Melekhovo - Fedotovo. The sequence of Hole 7k was recommended as a key one, while sequence of Samara meander (Yablonevo ravine) is suggested as a hypostratotype; f) stratotype of all fusulinid zones of Gzhelian stage - the Yablonevo ravine. The Kholodnyi Lug sequences was proposed to be considered as a hypostratotype of the zone and upper boundary of the stage.

The sequences proposed above must be finally approved at the principal session of the Commission after additional study of all faunal and flora groups with appropriate discussions of its results at special colloquiums.

The reviews of algae, spores and pollen showed that the leading role in Upper Carboniferous biostratigraphy is still played by foraminifera as shown by the fact that their zones which had been introduced into the General Carboniferous Scale, are recognized in all regions. The success achieved in studying conodonts, though permitted to establish correlation for a number of regions succession in appearance of some typical species as well as to identify by them 6 biostratigraphical subdivisions, is based however on still deficient actual material. Much attention was attracted by the delivery at the Meeting review on conodonts, marine and non-marine bivalves, ammonoids, brachiopods, algae, spore and pollen. The newly reported materials confirmed the opinion of majority of participans on correctness of the stage and zonal division of the Upper Carboniferous now in use on territory of the USSR European part and Central Asia. This has been fixed in the adopted resolution. The materials by M.N. Solovieva on foraminiferal assemblages in the boundary sequences of the Middle-Upper Carboniferous (Moscovian-Kasimovian stages) in Arctic, also reported at the Meeting deserve most careful consideration for correlation with the Upper Carboniferous of the USA. The Plenary Session did not consider the problems of the Upper Carboniferous of the Angaran Region which require special meetings. It only had heard three reports - by R.V. Solomina "Upper Carboniferous of the Verkhoyansk

province, by O.A. Betekhtina "On non-marine bivalves of the Angara Carboniferous' and by G.B. Grigorieva "On the flora of Angara". In the adopted decision was marked that the refinement of synchronism between subdivisions of the USSR General Scale and Angara Scale requires comparative study of flora, sporepollen assemblages and non-marine bivalves in Angara and Donbass. The latter was recommended to specialists of corresponding institutions.

At present the main activities of the group are directed to organizing the Meeting on adoption of the Unified Scheme of Upper Carboniferous stratigrpahy on the Russian platform.

For the past period, the Working Group took part in publication of "Upper Carboniferous" edited by V.V. Menner and A.D. Grigorieva, 13 quires, Publishing House "Nauka", dealing with materials reported at the Broadened Plenary Session of the ICC Carboniferous Commission held in 1981, as well as "Atlas of Late Carboniferous and Permian fossils of the Samara meander" edited by I.S. Muravev abd A.D. Grigorieva, about 12 quires, Publishing House of Kazan University (also in press). Atlas gives brief description of the sequence "Yablokovo ravine" and other sequences of the meander, as well as description of "fine" foraminifera, bryozoans, corals, brachiopods and conodonts from the sequences.

WORKING GROUP ON THE WESTPHALIAN A-C (C.F. WINKLER PRINS)

At X I.C.C., in Madrid September 1983, a proposal was handed in by B. Owens, N.J. Riley and M.A. Calver concerning 'Boundary stratotypes and new stage names for the early and middle Westphalian sequences in Britain'.

Unfortunately, the paper was not discussed at an SCCS meeting, because the meeting was canceled due to a lack of audience. At a special meeting of the SCCS Bureau with chairmen of working groups for NW Europe, there proved to be an opposition to the proposed names. They were considered rather complicated (for the non-British) and I was asked to investigate the possibility of alternative names, preferably beginning with A, B and C for the Westphalian A, B and C, respectively. Since a decision on the stratotypes was urgently needed for their protection, as explained by Dr. C.J. Cleal, it was decided to split the proposal and postpone the vote on the names. A motion, subject to ratification by the SCCS Working Group on the Westphalian A-C, was unanimously carried to accept the proposal of boundary stratotypes in the East Pennine Coalfield of B Stage and the base of the Westphalian C Stage as formal units at the locations indicated in the proposal by Owens, Riley & Calver presented at the SCCS Meeting held in Madrid, September 1983.

The vote on the ratification of this proposal among the working group members resulted in 11 votes in favour, 0 against and 7 abstentions. Early 1984, a vote will be held on three alternative sets of names.

Membership list:

Dr. M.J.M. Bless, Dr. K. Bokowski, Dr. M.A. Calver, Dr. C.J. Cleal, Dr. A. Delmer, Dr. R.M.C. Eagar, Dr. H. Fiebig, Dr. H. Grebe, Dr. V. Havlena, Dr. V. Holub, Dr. A. Jachowicz, Prof. J.P. Laveine, Dr. B. Owens, Dr. A. Rabitz, Dr. R.H. Wagner, Dr. G. Weiss, Dr. C.F. Winkler Prins.

WORKING GROUP ON THE WESTPHALIAN D (J. P. LAVEINE)

I have been and continue to be responsible for the Westphalian D Working Group. Our first priority at Czechoslovakia in 1973 was the order and subdivision of the interval as used by workers in other countries. I was disappointed in 1975 at the Moscow Congress by the proposals of Bouroz, Wagner, and others for a two-fold division of the Westphalian. It appeared that study of Westphalian D as used historically was useless work. My position is now the following one: until the subcommission has taken a clear (and stable!) position about the subdivisions of the upper Carboniferous, particularly stages, I do not intend to undertake a new report. It is not acceptable to change our positions and procedures from one meeting to another.