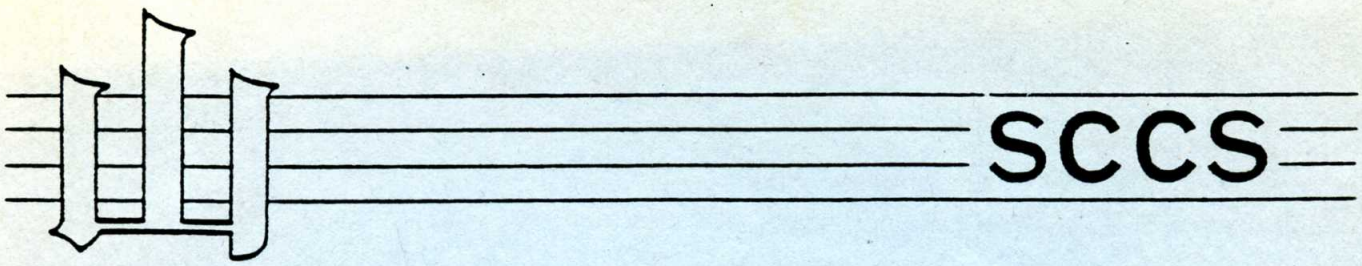

Newsletter on Carboniferous Stratigraphy

Number 4 (July, 1983)

The Newsletter on Carboniferous Stratigraphy is distributed to both titular and corresponding members 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 for some other solution such as an exchange.

Editor: Dr. W. Bruce Saunders
Department of Geology
Bryn Mawr College
Bryn Mawr, Pennsylvania
19010 United States

Associate Editor: Dr. Walter L. Manger
Department of Geology
University of Arkansas
Fayetteville, Arkansas
72701 United States

REPORT OF THE I.U.G.S. SUBCOMMISSION ON CARBONIFEROUS STRATIGRAPHY, 1982

Memberships and Officers

Effective 1st July 1982, Dr. R.H. Wagner, Vice-Chairman since 1980, became Chairman of the Subcommission for a two year term, succeeding Dr. W.H.C. Ramsbottom, who had been Chairman since 1980. Dr. Ramsbottom will be Vice-Chairman for the next two years. Also effective on this date, Dr. W.B. Saunders became Secretary of S.C.C.S., replacing Dr. C.F. Winkler-Prins, who has become Chairman of the Westphalian A-C Working Group. Dr. W.L. Manger has been elected the new Associate Secretary.

Five new titular members from the People's Republic of China have joined the Subcommission. They are:

Prof. YANG Shipu (Wuhang Geol. College) Chairman of Working Group on the Lower Carboniferous of China;

Dr. GAO Lianda (Chinese Acad. Geol. Sci., Beijing) Chairman of Working Group on the Middle Carboniferous of China;

Prof. LI Xingxue (Nanjing Inst. Geol., Acad. Sinica) Chairman of Working Group on the Upper Carboniferous of China;

Mr. YANG Xilu (Xian Inst. Geol. Exploration) Chairman of Working Group on the Carboniferous Coal-Measure units in China;

Prof. GUO Hongzun (Changchun Geol. College) provisional Chairman of Working Group on the Carboniferous of the Tianshan-Hinggan region.

Dr. R.H. Lane has become a titular member of S.C.C.S., with his appointment as Chairman of a special Committee on the lower/middle Carboniferous Boundary, for the duration of the term of that Committee, which is to recommend a boundary horizon to the Subcommission at the Madrid meeting, September 1983.

Activities

Most activities of the Subcommission during 1982 have been directed towards the fast-approaching X International Carboniferous Congress to be held in Madrid during September 1983. The most important activity concerns the efforts of the Subcommission to formally select an internationally agreed-upon lower-middle Carboniferous boundary. An *ad hoc* committee was created in Leeds, in 1981, to evaluate the extensive biostratigraphic data available, and to develop a formal proposal for a boundary, to be presented at the X.I.C.C. in Madrid in 1983, where this recommendation will be voted upon by the S.C.C.S. Plans have been made to devote a substantial effort to this in Madrid, with a two-day general Symposium addressing possible boundary choices, important reference areas and potential stratotype locations.

Membership of the Committee has been constituted as follows:
H.R. Lane (Chairman) Amoco Research Center, Tulsa, Oklahoma, U.S.A.
Joseph Bouckaert, Service Geologique de Belgique, Brussels, Belgium
Paul Brenckle, Amoco Production Company, Tulsa, Oklahoma, U.S.A.
O. Einor, Kiev State University, U.S.S.R.
V. Havlena, Charles University, Prague, Czechoslovakia
Alan Higgins, University of Sheffield, Sheffield, England
Marcel Weyant, University of Caen, France
Walter Manger, University of Arkansas, Fayetteville, U.S.A.
Walter Nassichuk, Institute of Sed. and Petrol. Geol., Calgary, Canada
Tamara Nemirovskaya, Ukrainian Academy of Sciences, Kiev, U.S.S.R.
Bernard Owens, Institute of Geological Sciences, Leeds, England
W.H.C. Ramsbottom, Institute of Geological Sciences, Leeds, England
E.A. Reitlinger, U.S.S.R. Academy of Sciences, Moscow, U.S.S.R.
Yang Jing-zhi, Nanjing Inst. of Geol. and Palaeont., Nanjing, China

Chairman of S.C.C.S., Dr. R.H. Wagner, reports that excellent progress is being made in securing world-wide coverage and participation for "The Carboniferous of the World" an S.C.C.S.-affiliated publication (C. Martinex, R.H. Wagner and C.R. Winkler-Prins, Editors). Publication of the first volume of what is to become a four-volume work is scheduled for August 1983.

Publications

Results of the 1981 S.C.C.S. Leeds Symposium were published in Spring 1982, as a special volume, Biostratigraphic Data for a Mid-Carboniferous Boundary, W.H.C. Ramsbottom, W.B. Saunders, and B. Owens, Eds. (155 pp., Leeds, 1982). This includes 24 papers by 32 specialists, and represents a major contribution to the biostratigraphy of the Carboniferous, in presenting a comprehensive, up to date review of biostratigraphic details of all significant groups of organisms.

Newsletter on Carboniferous Stratigraphy, No. 3 (C.F. Winkler-Prins, Ed.) was published in April 1982. This included accounts of the activities of the S.C.C.S., a list of members, publications and articles on correlation and chronostratigraphy. The Newsletter is proving to be an important and welcome means of circulating information and raising topics of interest to Carboniferous stratigraphers.

International Union of Geological Sciences
SUBCOMMISSION ON CARBONIFEROUS STRATIGRAPHY

Chairman: Dr. R. H. Wagner, Department of Geology, The University, Beaumont Building, Brookhill, SHEFFIELD S3 7HF, England
Vice Chairman: Dr. W. H. C. Ramsbottom, Institute of Geological Sciences, Ring Road Halton, LEEDS LS15 8TQ, England
Secretary: Dr. W. B. Saunders, Department of Geology, Bryn Mawr College, BRYN MAWR, Pennsylvania, 19010, U.S.A.
Tel. 215-645-5115
Associate Secretary: Dr. W. L. Manger, Department of Geology, University of Arkansas, FAYETTEVILLE, Arkansas, 72701, U.S.A.
Tel. 501-575-3355

May 24, 1983

Dear Members of SCCS,

The Subcommission on Carboniferous Stratigraphy is in good health. After the successful meeting in Leeds, 1981, the publication on 'Biostratigraphic data for a mid-Carboniferous boundary' (Ramsbottom, Saunders, and Owens, Eds.) duly appeared, and a further publication on the Carboniferous stratotypes of western Europe is in an advanced state of preparation. H.R. Lane's special Committee on the mid-Carboniferous boundary has prepared a full set of contributions to present at the General Assembly in Madrid this summer. This should allow us to select a suitable position for this most important boundary and to start working on the various alternatives for a stratotype.

Of course, this stratotype will also define the lower boundary of the first stage in the middle Carboniferous, and this will inevitably focus our attention on the size and general characteristics required for worldwide stages. Regional stages are currently of widely different size and biostratigraphic content, and the disparity of criteria with regard to these stages and their grouping into series is a problem that needs to be resolved. A discussion on this problem is likely to take place during the General Assembly in Madrid.

Several progress reports of working groups appear in this Newsletter. However, practically all the working groups (even those who have not sent in a progress report) have developed considerable activity in relation to the project 'The Carboniferous of the World'. Approximately half the contributions have been received and the editors (Martinez, Wagner, Winkler-Prins) have worked on a substantial part of these with the aim of publishing the first volume this summer. Contributors to 'The Carboniferous of the World' are being given the opportunity to present a summary of their often very substantial data at the General Assembly in Madrid.

The Subcommission has become more international in character, not only in name but also in practice, since the mid-Carboniferous boundary programme and, particularly, with the preparation of data for 'The Carboniferous of the World'. The cooperation of all Titular and Corresponding Members involved in these ventures is much appreciated. The wider international activity of the Subcommission is also noted in the planned venue for the next Field and General Meeting which is to take place in Argentina, in 1985.

We are all looking forward to a successful meeting in Madrid. A general programme for this General Assembly is given in this Newsletter. It promises to be a full one.

R.H. Wagner
Chairman

Budget

Income, 1982:

Balance carried over from 1981	$ 79.00
Grant received from IUGS (1982)	600.00
Newsletter revenues	20.00
Total Revenues	$ 699.00

Expenses, 1982:

Secretarial (to date)	$ 200.00
Newsletter No. 3	123.00
Anticipated Secretarial, remainder 1982	175.00
Anticipated Newsletter No. 4	200.00
Total Expenses	$ 698.00

Requested Budget, 1983:

Newsletter	$ 300.00
Secretarial, administrative	400.00
Total Requested	$ 700.00

PROGRAM OF SCCS ACTIVITIES*
XICC, MADRID, 1983

Sat., 10 Sept. (all day) SCCS Symposium
Proposal for Mid-Carboniferous Boundary and possible stratotypes
H.R. Lane, Chairman

1. Opening statement, summarizing conclusions of Leeds Symposium, 1981.
2. Proposal for a mid-Carboniferous boundary.
3. Possible Stratotypes for the mid-Carboniferous boundary (see attached program of abstracts).

Sun., 11 Sept. (morning) SCCS General Assembly I (Open Meeting)
Discussion of Proposed Mid-Carboniferous Boundary and Stratotype Selection

Mon., 12 Sept. (afternoon) SCCS Symposium
Carboniferous of the World: Present Status and Future Prospects
R.H. Wagner, C.F. Winkler-Prins, W.B. Saunders, Co-Chairmen

(a series of presentations by contributors to "Carboniferous of the World" summarizing regional Carboniferous geology and outlining future areas for investigation)

Tues., 13 Sept. (afternoon) SCCS General Assembly II (Open Meeting)

I. Status of Stages in Regional Carboniferous Stratigraphic Classification
(Presentations of present status of regional classifications by SCCS Working Group Chairmen).

II. Announcement of decision by SCCS regarding Mid-Carboniferous Boundary proposal

* Exact times and locations will be posted or announced at XICC in Madrid.

SELECTING A MID-CARBONIFEROUS BOUNDARY AND STRATOTYPE

At Leeds, in 1981, an ad hoc Committee, chaired by Dr. H.R. Lane, Tulsa, Oklahoma, was created with a charge:

> "To investigate and evaluate the information available with regard to a possible 'lower/middle' Carboniferous boundary with emphasis on biostratigraphy from all parts of the world, and based on the information provided and views expressed at the 1981 symposium in Leeds; and to provide a report and recommendation to be presented at the next SCCS meeting in Madrid in 1983."

The formal proposal will be presented during a symposium of SCCS in Madrid on Saturday morning, Sept. 10; there will be an opportunity to discuss the proposed boundary and stratotype selection on Sunday, Sept. 11 during an SCCS general assembly. The boundary proposal will be formally voted on by SCCS Titular Members during the Madrid meetings and there will be an announcement of the results of the decision on Tuesday, Sept. 13. The following section summarizes the recommendations of the ad hoc Committee concerning the boundary as they will be presented in Madrid.

PROPOSAL FOR AN INTERNATIONAL MID-CARBONIFEROUS BOUNDARY

By The Mid-Carboniferous Boundary Committee of The International Subcommission on Carboniferous Stratigraphy, H. Richard Lane, Chairman, Joseph Bouckaert, Paul Brenckle, O.L. Einor, V. Havlena, A.C. Higgins, Yang Jing-Zhi, Walter Manger, Walter Nassichuk, Tamara Nemirovskaya, Bernard Owens, W.H.C. Ramsbottom, E.A. Reitlinger, Marcel Weyant

Recommendations of the Committee

The Mid-Carboniferous Boundary Committee proposes the following recommendations to the Subcommission for its consideration:

1. That selection of a boundary within the middle of the Carboniferous shall correspond approximately to the change from the Eumorphoceras to Homoceras ammonoid zones.

2. That, although the boundary be selected in the Eumorphoceras-Homoceras zonal transition, the appearance of Homoceras subglobosum can be utilized only regionally in this definition. The known distribution of this species, on which the base of the Homoceras Zone is defined, is restricted geographically to Europe and thus not a suitable defining taxon worldwide.

3. That the conodont Declinognathodus noduliferus (Ellison and Graves) appears at approximately the same stratigraphic level, overlaps in range with its ancestor Gnathodus girtyi simplex Dunn and occurs abundantly worldwide in all major regional Carboniferous stratotypes. For these reasons, the appearance of this species is recommended for defining a mid-Carboniferous boundary.

4. That the evolutionary appearances of other species, especially those from other fossil groups, be utilized as auxiliaries to define or approximate this boundary. This would be especially useful where D. noduliferus is absent and would enhance the correlatability of the chosen biostratigraphic level. Currently, these auxiliary species include the foraminifers Globivalvulina n. sp., Millerella pressa Thompson and Millerella marblensis Thompson and the conodonts Adetognathus lautus (Gunnell), Rhachistognathus primus Dunn and Rhachistognathus minutus Higgins and Bouckaert.

5. That additional representatives from various fossil groups be added to the official Subcommission list of auxiliary boundary defining species in Item 4 as their biostratigraphic significance is determined. Each proposed addition must be recommended by the Committee and approved by the Subcommission.

6. That the mid-Carboniferous Boundary Committee shall now begin the task of locating a stratum where a suitable boundary stratotype may be defined and to make further recommendations to the Subcommission on Carboniferous Stratigraphy at a future date concerning specific locality, horizon, and worldwide nomenclature.

SCCS SYMPOSIUM - POSSIBLE STRATOTYPE SECTIONS FOR THE DEFINITION OF A MID-CARBONIFEROUS BOUNDARY

In addition to the boundary horizon proposal and vote, the morning and afternoon of Saturday, Sept. 10 will be devoted to a symposium entitled "Possible Stratotype Sections for the Definition of a Mid-Carboniferous Boundary." The symposium, organized by H.R. Lane and his committee, will include the following papers:

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., Lis, 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. (U.S.A.).

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

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

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

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

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. (U.S.A.).

ABSTRACTS OF SCCS BOUNDARY SYMPOSIUM PAPERS

Tentative Discussion on the Mid-Carboniferous Boundary of China

Yang Jing-zhi

Nanjing Institute of Geology and Palaeontology Academia Sinica

In the light of the recent advances in the Carboniferous biostratigraphy of China as well as the current tendency to the Carboniferous division in the world, most paleontologists and stratigraphers of China are inclined to hold the two-fold division of the Carboniferous. Unfortunately, since the ability to adapt the environments and evolutional rates of various faunas are apparently different, the specific lines proposed to draw the boundary between the Upper and the Lower Carboniferous are not at the same horizon. Since the planktonic faunas such as ammonoids, conodonts, foraminifers, etc., extensively wide-spread, the classification and correlation of strata based on them are much more accurate than the benthonics. The stratigraphucal boundary we discussed here should be delimited upon the evolution and diversification of the planktonic faunas. Therefore, the ideal sections for this aim should be depositionally continuous.

In Qixu of Nandan county, Guangxi four ammonoid zones have been recognized by Ruan Yi-ping (1981). In ascending order they are: 1. Eumorphoceras plummeri-Dombarites falcattoides zone (E zone), associated with Trigonoceras, Platygoniatites and Ferganoceras, etc. Among them Eumorphoceras and Ferganoceras may be present in the entire zone; 2. Homoceras nudum zone (H zone), containing Homoceras, Stenopronorites, Syngastrioceras, Epicanites, Aclistoceras and Paradimorphoceras associated with conodont Idiognathoides noduliferus; 3. Retites carinatus zone (Re zone), using Retites semiretia McCaleb as the type of the genus which may compare with Reticuloceras zone (H zone) of Europe; and 4. Branneroceras branneri zone (B zone), containing Branneroceras Stenopronorites Syngastrioceras, Ramosites, and Gaitherites approximately corresponds with the G zone of Europe.

The evolutional rates of Ammonoids vary in different geological ages, as shown by their sutures. For example, the sutures of Early Carboniferous ammonoids are of more primitive type characterized by a narrow and long ventral lobe, 8 lobes and saddles with each side usually straight, as seen in those of Goniatites and Beyrichoceras. However, the suture of goniatites (gastrioceratic) in early Late Carboniferous, as they share the S-shaped side of central and lateral lobes and high column-like saddle. As pointed out, the rates of evolution in Early and Late Carboniferous ammonoids were inconsistent.

The Early Carboniferous goniatites mostly developed rapidly and existed in a shorter range. Whereas the Late Carboniferous ammonoids developed slowly and had a longer range. Furthermore, the early Late Carboniferous goniatites, are considerably distinct from the Early Carboniferous ones in their generic composition, are known to include such families as Reticuloceratidae, Gastrioceratidae, etc.

Add to this, the end of the Early Carboniferous was a turning point in the evolution of Nautiloids. Actinoceratids became nearly extinct. Some Early Carboniferous nautiloids developed rapidly, and thus appeared the representatives of Rayonnoceras, Carbactinoceras, Mitorthoceras, Tylonautilus, Stroboceras, Epistroboceras, etc. Contrasting,the Late Carboniferous nautiloids evolved slowly and devoid of characteristic forms.

Based on the evolution of ammonoids and the diversification of their taxa the mid-Carboniferous boundary lines in China should be drawn between the Eumorphoceras zone and Homoceras zone. In other words, the first appearance of Homoceras marks the base of the Upper Carboniferous. Accordingly, the Mid-Carboniferous boundary line in Qixu region of Nandan county, northern Guangxi should be drawn between the Locheng Formation and Huanglung Formation.

On the Eostaffella Fauna

Zhang Lin-xin

Nanjing Institute of Geology and Palaeontology, Academia Sinica
Nanjing, People's Republic of China

The Eostaffella fauna is extensively developed and well distributed in China, with the exception of North China. It comprises many important elements, such as Eostaffella hohsienica Chang, E. ascepta Ganelina, E. galinae Ganelina, E. irenae Ganelina, E. ikensis tenebrossa Vissarionova, E. ozawainellaeformis Chang, etc. The Eostaffella hohsienica zone or the Eostaffella zone is regarded as the lowermost fusuline zone of the Carboniferous system. The Eostaffella-bearing formations are widely distributed in China. They are: the Hochow formation in Anhui, the Zhaojishan formation in Western Guizhou, the Shidengzi member in Guangxi, the Xuchika formation in Western Sichuan, the Machala formation in Xizang, the Lujuanlun formation in Jilin and the Akeshake formation in Xinjiang. The Eostaffella fusulinids were found in association with Yuanophllum kansuense Yu, a coral zone fossil of the latest Lower Carboniferous, and Gigantoproductus edelburgensis (Phillips), a brachiopod zone fossil of the early Namurian. The Eostaffella hohsienica zone or the Eostaffella zone conformably overlies the zone of Homoceras of Lower Carboniferous age and is conformably overlain by the zone of Pseudostaffella. The Pseudostaffella zone is characterized by the presence of the genus Pseudostaffella. It is associated with abundant Reticuloceras kueichouensis Chao et Liang, Gastrioceras cf. cumbriense Bisat, Choristites mansuyi Chao, etc. The Eostaffella hohsienica zone or the Eostaffella zone is most probably equivalent to the Eostaffella kanmerai subzone of Japan, and may be at least partly correlated to the Millerella zone of North America.

The Upper Serpukhovian of the Donetz Basin and Lower and Middle Carboniferous Boundary

David Aisenverg, Nina Brazhnikova, Tamara Nemirovskaya, and Vladislav Poletaev

Geological Institute of the Academy of Sciences of the Ukraine, SPR, Tchkalova 55b, Kiev-54, 252054, USSR

The highest part of the Serpukhovian Stage within the type area (Moscow syneclise) is missing because of a long term pre-Vereian hiatus. One can observe this part of the Serpukhovian in practically uninterrupted Carboniferous succession in the Donetz Basin. Here the deposits of the Zapaltubinsky and Voznessensky Horizons are found to be out-cropping along the Kalmiuss river and its tributaries (Aisenverg and others, 1975, publ. 1978). Zapaltubinsky Horizon embraces the interval between the D_3 and D_6 Limestones of the C_4 suite with a rich and diverse fauna, it appears to be refer to the E_2 subzone. Voznessensky Horizon represents the upper part of the C_4 suite above the Limestone D_6 with a sharply impoverished fauna; it corresponds with the Homoceras Zone. The overlying the E_1 Limestone group is the base of the Bashkirian. It contains abundant and diverse fauna with goniatites of the Reticuloceras Zone.

The most significant faunal change at the base of the Homoceras Zone has been previously established by some of the Donetz Basin Carboniferous specialists (Brazhnikovs, Vassiliuk, Nemirovskaya). However, the limited distribution and narrow palaeontological characteristics of this Zone make the majority of the Soviet stratigraphers to prefer a more widely distributed base of the Reticuloceras Zone as the Lower and Middle Carboniferous boundary.

La Limite Mississipien-Pennsylvanien Dans Les Pyrenees Francaises

Marie-France Perret

Laboratoire de Géologie-Pétrologie, 38 rue des Trente-six Ponts 31400 Toulouse, FRANCE

Les coupes observées dans les Pyrénées françaises ont permis d'analyser la distribution verticale des organismes dans les séries marines essentiellement carbonatées d'âge namurien.

De façon générale viennent, à la base, des calcaires micritiques versicolores, riches en organismes variés, (ostracodes, crinoides, globochaetes, goniatites, conodontes). Parmi les conodontes, abondants et diversifiés, on remarque: Gnathodus bilineatus bilineatus,

Gn. bil. bollandensis, Paragnathodus commutatus, Par. nodosus, Par. multinodosus, Ligonodina roundyi, Neoprionodus sp., Spathognathodus sp., Ozarkodina sp.. Viennent ensuite des calcaires micritiques sombres, en dalles régulières, à fines laminations. Les conodontes y sont en moins grand nombre et moins diversifiés; les premières formes rencontrées ici sont Declinognathodus noduliferus et D. lateralis qui, dans quelques cas, peuvent encore être accompagnées de rares Gnathodus, puis suivent Idiognathoides sinuatus et Id. sulcatus et enfin Id. sulcatus cf. parvus. Cette série carbonatée a une épaisseur qui peut varier de quelques mètres à peine, à plusieurs centaines de mètres; au-dessus se développe un puissant "culm" gréso-pélitique.

Mis à part les conodontes les coupes concernées ne renferment que quelques niveaux à goniatites, parmi lesquels un niveau à Dombarites acicularis (Pareyn), (passage V3c-E1) et un niveau à Reticuloceras circumplicatile (Foord), (Namurien B, R1). La limite Mississipien-Pennsylvanien est donc marquée par l'évolution des seuls conodontes, ce qui rend difficile les corrélations entre les zones étudiées dans les Pyrénées francaises et les dépôts équivalents d'Europe et d'Amérique du Nord.

Il est toutefois possible de noter qu'ici aussi le changement majeur dans la microfaune de conodontes se situe à l'apparition des premiers Declinognathodus, c'est à dire au passage E2-H1.

Recognition of a mid-Carboniferous boundary in the Pennine Province, England

Ramsbottom, W.H.C.,[1] Higgins, A.C.[2] and Owens, B.[1]

1. Institute of Geological Sciences, Ring Road Halton, Leeds LS15 8TQ, England
2. Institute of Sedimentary & Petroleum Geology, 3303 3rd St. NW Calgary, Alberta T2L 2A7 Canada

The recognition of a major stratigraphic break within the Carboniferous must ideally be supported by significant palaeontological changes in more than one fossil group if it is to have potential for interregional correlation. The almost total change in the ammonoid faunas from those dominated by cravenoceratids forms in the Arnsbergian to those with reticuloceratids and gastrioceratids in the later Namurian takes place at the base of the Chokierian (H_1) in Britain. This change is coincident with similar total changes in the conodont faunas in which gnathodid dominated faunas are replaced by declinognathodid dominated ones.

In the Pennine Basin of northern England approximately 6000 ft of more or less continuous Namurian deposition provides the opportunity for detailed investigation of macrofaunal and microfaunal and floral distribution patterns. The section at Gill Beck, Cowling, West Yorkshire which is the boundary stratotype section for the Chokierian Stage in northwest Europe is here proposed as a reference section for a mid-Carboniferous boundary. The appearance of the ammonoid Homoceras subglobosum at the base of the Chokierian in this section coincides with the appearance of the conodont Declinognathodus noduliferus, both characters which can be utilised in the definition of a mid-Carboniferous boundary. The proposed boundary does not coincide with any significant palynological change but represents a continuation of the palynomorph assemblages which were introduced somewhat earlier in E_2b.

The Mid-Carboniferous Boundary in the Bechar Basin (Algeria)

Yves Lemosquet, Maurice Lys, Claude Pareyn, Marcel Weyant

Laboratoire de Geologie, Universite de Caen, FRANCE

The Carboniferous marine series of the Bechar area shows a sequence of formations ranging in age from lower Tournaisian to upper Moscovian (Podolskian). Its thickness may amount up to 5500 m. The varied carbonate or detritral facies correspond to platform deposits along the northern border of the African craton. Within these deposits, a detailed investigation of the Djenien and Tagnana Formations, of Serpukhovian age, provides evidence of the following sequence of events:

- a period of exundation materialised by karst phenomena,
- a succession of nine shaly-carbonate sedimentation recurrences locally transected by huge systems of ravining channels filled up by conglomerates and sandstones with plant remains,
- a generalized resumption of the carbonate sedimentation.

Biostratigraphical studies of the goniatites, the conodonts, the foraminifera, the brachiopods and the corals show several successive faunal zones from the Arnsbergian to the Alportian. An accurate definition of a Mid-Carboniferous boundary meets hindrance because there happens to be no rigorous correspondence between faunal zones resulting from the various groups of fossils. Moreover the lithological diversity does not allow a choice of any type section in which all the fossil groups would be present. One would rather have to consider several complementary sections.

A fairly good criterion for a Mid-Carboniferous boundary would be the first appearance of a well recognizable and wide-spread marker such as for instance Rhachistognathus muricatus, Declinognathodus noduliferus or Asteroarchaediscus postrugosus.

Boundary stratotype for the base of the Pennsylvanian System, east-central Appalachian basin, U.S.A.

Kenneth J. Englund, Thomas W. Henry, William H. Gillespie, Hermann W. Pfefferkorn, and Mackenzie Gordon, Jr.

U.S. Geological Survey, Reston, VA 22092, Washington, DC 20560, and Charleston, WV 25314; U. of Pennsylvania, Philadelphia, PA 19174.

The Upper Mississippian and Lower Pennsylvanian Series in the eastern part of the central Appalachian basin consists of about 1,800 m of intercalated marine and nonmarine rocks. In this sequence, the Mississippian-Pennsylvanian boundary traditionally has been placed at or near the conformable to near-conformable contact between the Bluestone Formation and the overlying Pocahontas Formation.

Based on recent litho- and biostratigraphic studies associated with the U.S. Geological Survey's program to establish a stratotype for the Pennsylvanian System, we recommend a boundary stratotype section for the base of the Pennsylvanian at the contact between the Bramwell Member of the Bluestone Formation and the lower sandstone member of the Pocahontas Formation in the type area of both formations near Bluefield, Virginia-West Virginia, at the eastern edge of the Appalachian basin. Because the lower sandstone member of the Pocahontas interfingers with the upper member of the Bluestone in this area, the systemic boundary extends laterally from the base of the lower sandstone member in the proposed stratotype section to the base of the upper member of the Bluestone Formation. This generally conformable relationship at the systemic boundary extends from the proposed stratotype north-westward for about 50 km to an area where a widely recognized unconformtiy truncates both the Pocahontas Formation and the upper part of the Bluestone Formation.

The proposed boundary at the base of the Pennsylvanian System corresponds florally to the Namurian A - Namurian B boundary in western and central Europe, and the Bramwell Member contains marine faunas correlating with the uppermost Chesterian Provincial Series (uppermost Mississippian) in the midcontinent region of North America.

Mid-Carboniferous Biostratigraphic Relations, Southern Midcontinent, North America

Manger, Walter L., Department of Geology and University Museum, University of Arkansas, Fayetteville, Arkansas 72701, United States
Sutherland, Patrick K., School of Geology and Geophysics, University of Oklahoma, Norman, Oklahoma 73019, United States

Sequences referred to the Chesterian and Morrowan Series (Upper Mississippian and Lower Pennsylvanian) in the southern midcontinent, North America, are separated by an unconformity of variable magnitude when compared to the type Namurian Series of Europe. The Grove Church Shale of the type Chesterian region, southern Illinois yields Adetognathus unicornis Zone conodonts, Mamet Zone 19 foraminifers, but no ammonoids, suggesting equivalence to the Namurian Arnsbergian Stage (upper E_2a-lower E_2b). Continuous deposition across the Mississippian-Pennsylvanian boundary has been reported in this area based on the identification of A. unicornis in strata regarded previously as the Pennsylvanian Caseyville Formation. Full documentation of these relations is lacking and elsewhere in the area, the lower Caseyville contains plants of middle Morrowan age, equivalent to upper Westphalian A.

In the type Morrowan region, northern Arkansas, the Imo Formation, highest Chesterian, contains upper Arnsbergian (E_2b-c) ammonoids with Mamet Zone 19 foraminifers and A. unicornis Zone conodonts. The Cane Hill Member, Hale Formation, basal type Morrowan, yields lower Kinderscoutian Stage (R_1a) ammonoids with Millerella (Mamet Zone 20) and Rhachistognathus primus Zone conodonts. In northwestern Arkansas, the Cane Hill Member may overlie the older Chesterian Pitkin or

Fayetteville Formations of lower Arnsbergian (E_2a) or Pendleian (E_1) age respectively. In northeastern Oklahoma, the Morrowan Braggs Member, Sausbee Formation contains Idiognathoides sinuatus Zone conodonts of Kinderscoutian (R_1) or Marsdenian (R_2) age in contact with the Pitkin Formation of presumed lower Arnsbergian (E_2) age.

Placement of a mid-Carboniferous boundary at a horizon equivalent to the base of the Chokierian (H_1) Series is compatible with biostratigraphic relations known in the type areas for both the Chesterian and Morrowan Series, but neither area is suitable for a boundary stratotype.

Latest Mississippian-Earliest Pennsylvanian (Namurian) conodont biostratigraphy of the northern Rocky Mountains, U.S.A.

Bruce R. Wardlaw

U.S. Geological Survey, Washington, D.C. 20560

Conodont faunas in the northern Rocky Mountains, especially south-western Montana, contain elements of both the mid-continent/Arkansas succession in the USA and the succession in Belgium and England and improve correlation of Lower Namurian European faunas to those of North America. Three subzones of the Rhachistognathus muricatus Zone define the Mississippian-Pennsylvanian boundary in most sections throughout the region. Latest Mississippian is recognized by Adetognathus unicornis and various species of Gnathodus and Cavusgnathus within the range of R. muricatus. Earliest Pennsylvanian is recognized by a flush of species of Adetognathus, Declinognathodus, and other Pennsylvanian forms within the range of R. muricatus. The systemic boundary datum helps clarify the depositional history of the region. The depositional model for the Amsden Formation of Wyoming of Sando et al (1975) is confirmed. Deposition was nearly continuous across the Mississippian-Pennsylvanian boundary throughout most of western Wyoming, southwestern Montana, and eastern Idaho. The thrust belts in Wyoming/Idaho and Montana show similar development of structural-depositional basins that included the deposition of the boundary strata and the advent of sandstone deposition in earliest Pennsylvanian time.

Possible Mid-Carboniferous Boundary Stratotype in South-Central Idaho

Skipp, Betty, U.S. Geological Survey, Box 25046, M.S. 913, Denver, CO 80225, USA; Baesemann, John F., and Brenckle, Paul L., Amoco Production Company, Research Center, P.O. Box 591, Tulsa, OK 74102, USA.

The mid-Carboniferous (Mississippian-Pennsylvanian) boundary in the White Knob Mountains of south-central Idaho lies in the lowermost beds of the Bloom Member of the Snaky Canyon Formation within a carbonate bank sequence of thick to thin bedded, sandy and argillaceous limestone and minor dolomite. There are no apparent sedimentation breaks across the boundary. Closely spaced samples were collected

from the lower Bloom and from the underlying Bluebird Mountain and upper Surrett Canyon Formations at Wood Canyon and Timbered Dome. These beds contain foraminiferal faunas in which Late Mississippian eosigmoilinids are succeeded by Early Pennsylvanian millerellids, primitive globivalvulinids and biseriellids with a pseudofibrous layer. Associated conodont faunas represent the Late Mississippian Adetognathus unicornis and the earliest Pennsylvanian Rhachistognathus primus Zones. The intervening latest Mississippian Rhachistognathus muricatus Zone has not been recognized and probably falls mostly within the Bluebird Mountain sandstones. At Wood Canyon, eosigmoilinid foraminifers occur anomalously in the Rhachistognathus primus Zone. A sparse megafauna of brachiopods, bryozoans, mollusks and corals is present but, as yet, unstudied. Apparent uninterrupted sedimentation across the Mississippian-Pennsylvanian boundary, a reasonably complete conodont and foraminiferal succession, and the presence of megafossils make the White Knob Mountains a possible candidate for a mid-Carboniferous boundary stratotype.

Arrow Canyon, Nevada - A Potential Mid-Carboniferous Boundary Stratotype Section

H. Richard Lane and Paul L. Brenckle

Amoco Production Company, Research Center, P.O. Box 591, Tulsa, OK 74102 USA; West, R.R., Dept. Geology, Kansas State Univ., Manhattan, KS 66505 USA

The mid-Carboniferous sequence exposed in Arrow Canyon, Clark County, Nevada, is one of the most biostratigraphically complete in the world and contains multiple paleontologic events that are potentially useful in defining a boundary. These events occur within a depositional package represented by the Indian Springs and lower Bird Spring Formations. Previous paleontologic studies have placed the Mississippian-Pennsylvanian boundary within the Bird Spring at 85.4 m above the base of the depositional package. However, significant biotic changes in the conodonts, foraminifers and brachiopods begin with the first occurrence of Adetognathus gigantus at 72.9 m and continue with appearances of Rhachistognathus primus and Globivalvulina n. sp. at 85.4 m, Spirifer gorei and Neospirifer camaratus at 90.6 m, Declinognathodus noduliferus s. l. and Millerella pressa at 91.65 m, Millerella marblensis at 92.65 m, Rhachistognathus minutus at 97.25 m, and Neognathodus symmetricus at 97.75 m. Y-branch evolutionary sequences for Globivalvulina n. sp. and for the above conodonts except N. symmetricus can be demonstrated in our collections. Thus, several positions for defining a mid-Carboniferous boundary exist at Arrow Canyon. The attractiveness of this section as a boundary stratotype is further enhanced by its ready accessibility and nearly complete exposure.

A Sedimentologically Continuous Section Across the Mississippian-Pennsylvanian Boundary, Granite Mountain, Utah, U.S.A.

Mackenzie Gordon, Jr., T.W. Henry, and Bernard Mamet

U.S. Geological Survey, Washington, DC 20244, U.S.A., and Université de Montréal, Montréal, Quebec, Canada.

The boundary between the Mississippian and Pennsylvanian in most North American basins is characterized by a hiatus, a strong regression or transgression, or other important facies changes. Therefore, the boundary generally coincides with the contact between two formations, as in the type regions of both of these major stratigraphic units. Sections in which the faunal succession occurs in a stratigraphic continuum characterized by few ecologic changes are rare.

At Granite Mountain, Juab County, Utah, faunal changes at this boundary are not associated with major changes in sedimentologic succession and occur within a normal shallow-water, open-marine carbonate sequence. In a section on the east slope of Granite Mountain, the lower 64 m of the Ely Limestone consist of three major lithic units. The lowest of these, 24 m thick, consists of massive cliff-forming, lump and fossil grainstones-wackestones. This is overlain by 14 m of recessive-weathering, shaly, sponge-rich wackestones. The third (upper) unit, 26 m thick, is a rhythmic succession of wackestones, packstones, and grainstones. The Mississippian-Pennsylvanian boundary lies in the middle of this upper unit. It is marked by the first occurrence of Millerella-Globivalvulina (Zone 20) and by brachiopods of the Rugoclostus "zone". Strata below this boundary contain a typical North American, undiversified eosigmoilinid assemblage (Zone 19) and brachiopods of the Rhipidomella nevadensis Zone. The eosigmoilinids disappear in this section 4 to 5 m below the lowest occurrence of the millerellids, leaving a short interval of non-diagnostic foraminifers between the latest Mississippian and the earliest Pennsylvanian faunas.

CARBONIFEROUS OF THE WORLD

In 1980, a comprehensive overview of the Carboniferous of the World was undertaken, as a joint project by the Spanish Committee on Stratigraphy and the Stratigraphic Subcommission (S.C.C.S). Drs. Carlos Martinez Dias (Main Editor) and R.H. Wagner and C.F. Winkler-Prins (S.C.C.S Editors) are heading this ambitious project, which will include more than a dozen contributions covering the major regions of Carboniferous geology in the world (see below). Dr. Wagner has reported that the first of this four-volume series will be printed by September, and will include the sections on China, Japan, Korea and Southeast Asia. In recognition of the broad interest in this subject, S.C.C.S. will be sponsoring a symposium during the Madrid Meetings, on Monday afternoon, Sept. 12, entitled "Carboniferous of the World: Present Status and Future Prospects" that will feature summaries of the contributions by those authors present and will focus on subjects that should receive attention in the future.

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THE CARBONIFEROUS OF THE WORLD

C. Martinez Diaz, R.H. Wagner and C.F. Winkler-Prins, Eds.

Volume 1: China (Yang Shipu, Lin Yintang, Tang Guansiu, Wang Zhiping & Wu Shizhong - lower Carboniferous; Gao Lianda, Wang Zengji & Wu Xianghe - middle Carboniferous; Li Xingxue & Zhang Linxin - upper Carboniferous)
Korea (C.H. Cheong)
Japan (M. Minato, in coll. with Kato and Winkler-Prins)
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Volume 2: Australia (J. Roberts et al.)
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South America (S. Archangelsky & Rocha Campos, et al.)
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Middle East (O. Monod et al. - still to be produced)
North Africa (Y. Lemosquet et al.)

Volume 4: North America (lower Carboniferous stratigraphy and depositional history of Canada - E.W. Bamber & B.L. Mamet; lower and middle Pennsylvanian stratigraphy in North America - P.K. Sutherland, W.L. Manger & T.J. Turmelle; Summary of upper Pennsylvanian stratigraphy of North America - R.M. Kosanke; still outstanding: Mississippian of USA - C. Collinson
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Dinantian + lower Namurian (G.A.L. Johnson & A.C. Higgins)
middle + upper Namurian, Westphalian (A.C. Higgins, Winkler-Prins & J.P. Laveine)
Stephanian (R.H. Wagner, J. Doubinger, P. Vetter & V. Havlena)
(received: Doubinger & Vetter - The Stephanian of France E.F. Escher - Carboniferous of Switzerland both still to be integrated)

Tentative subdivision into major geological areas: East Asia, Gondwana, Eastern Europe + Middle East + Central Asia + Angara + North Africa, Euramerica. The final volume should also contain a general integration according to plate tectonics (D. Tarling et al.) and, possibly, an attempt at general correlation and suggestions for an integrated chronostratigraphy.

Time schedule: Vol. I - Sept. 1983 R.H.W. May 1983
Vol. II - Dec. 1983
Vol. III - July 1984
Vol. IV - Dec. 1984

SCCS Working Group Progress Reports

WORKING GROUP OF WESTPHALIAN A-C (C.F. Winkler-Prins)

Since the progress report at the Prague Meeting of S.C.C.S. (Calver & Owens, 1977) some important papers on the Westphaluan were published by Bless et al. (1977: Meded. Rijks Geol. Dienst, N.S., 28: 101-147) and by Ramsbottom et al. (1978: Spec. Rep. Geol. Soc. London, 10). Useful information was obtained during the S.C.C.S. Field Meeting in the British Isles in 1981, when the proposed boundary stratotypes for the Westphalian A, B and C were visited. Information on these stratotypes was published in the field guide and will be given in the book on West-European Carboniferous stratotypes. The sections are not ideal, especially the one for the Westphalian B/C boundary which is however to be replaced by a better suited one nearby, but they appear to be the best surface exposures available in Northwest Europe. Since these stages are traditionally linked to marine bands, difficult to trace elsewhere, it will be best to have the boundary-stratotypes in Northwest Europe, i.c. in England as proposed at VII I.C.C. in Drefeld 1971 (George & Wagner, 1972). A formal proposal has been prepared by B. Owens and M.A. Calver for the S.C.C.S. Meeting in Madrid to accept these stratotypes and to properly name these stages as follows:

Proposed name	Old name	Type section	
Bolsovian	Westph. C	Stairfoot Brickworks near Barnsley (to be replaced by section nearby)	base of Aegiranum M. (=Mansfield M. Bd)
Duckmantian	Westph. B	Duckmanton railway cutting (4 km E. of Chesterfield)	base Vanderbeckei M. (=Clay Cross M. Bd)
Langsettian	Westph. A	Banks of the River Little Don (1 km E of Langsett)	base of Subcrenatum M. Bd (=Pot Clay M. Bd)

The Langsettian boundary stratotype is automatically also the Namurian/Westphalian boundary stratotype.

Unfortunately, the discussion of Carboniferous floral zones in Urbana, 1979, at IX I.C.C. by R.H. Wagner has not yet been published. Conodont information is being prepared by A.C. Higgins, but not yet available.

Correlation of the Westphalian A, B and C with other chronostratigraphic subdivisions for Laurasia still poses many problems, not to mention correlation with Gondwanaland. A major problem is the correlation of the Bashkirian/Moscovian boundary of the Soviet subdivision: based on information from the Donbass (USSR) it should lie close to the Westphalian B/C boundary, whilst information from the Cantabrian Mts (Spain) indicates a position low in the Westphalian A (the evidence is discussed by Wagner & Bowman, in prep.).

Since the publication of the comprehensive report on the Cantabrian stratotype by Wagner, Park, Winkler-Prins and Lys (1977), a summary of the available information on the two lower Stephanian stages, Cantabrian and Stephanian A, has been published by Wagner and Winkler-Prins (1979). These correspond to presentations at SCCS meetings in Prague and Moscow, respectively (1973, 1975). In 1978, Winkler-Prins and Wagner presented a more detailed report on the Stephanian A in its stratotype. Most of the information provided in these publications refer to the stratotypic area of Northwest Spain, but the 1979 publication also included data provided by J. Doubinger and P. Vetter for the Stephanian A in the Massif Central, France.

An account of more terrestrial facies developed in the western part of the sedimentary basin which contains the Cantabrian unit-stratotype and the Stephanian A boundary-stratotype, has been given by Wagner and Fernandez-Garcia at the 9th Int. Congress of Carboniferous Stratigraphy and Geology, held at Urbana, 1979. This account is still in press. Further work has been done on the substantial collections of fossil plants, brachiopods and other marine fauna obtained from the Cantabrian stratotype area. Records of floral remains corresponding to about 600 localities and representing many thousands of specimens from the Cantabrian stratotype area are being prepared for publication by the Instituto Geologico y Minero de Espana. This study has allowed the changes in floral composition across the Westphalian D / Cantabrian boundary interval to be distinguished in fair detail. It is noted that the conventional lower boundary of the Cantabrian Stage in its stratotype, i.e. at the Lores Limestone in the area of the La Pernia, northern Palencia (George and Wagner, 1972), occupies a position below the floral change which marks the boundary between the vestita and cantabrica floral zones proposed by Wagner (in press). The concept of the Cantabrian Stage and its delimitation against Westphalian D, as known in the literature, is bound up closely with the composition of floras and the ranges of certain floral elements. It may therefore be useful to propose a new definition of the base of the Cantabrian Stage within the stratotype section as accepted in the SCCS meeting at Krefeld, 1971, and to make the lower boundary-stratotype coincide with the zonal boundary as mentioned above. A proposal to this effect may be put before the Subcommission at its General Assembly in Madrid. It is noted that much geological work has been done recently on the stratotype area, leading to accurate correlations within the sedimentary basin. A new proposal for a boundary-stratotype will come close to that presented with regard to the fossil-rich Tejerina section at Sheffield, 1967 (Wagner et al. 1969). The position of that section with regard to the predominantly marine stratotype which includes the Lores Limestone, is now understood much better than in 1967.

Data on both the Cantabrian and Stephanian A boundary-stratotypes are being prepared for the book on West-European Carboniferous stratotypes, which is being edited by B. Owens in Leeds, and a formal name for the Stephanian A, Barruelian (after the type locality Barruelo de Santullan, Palencia, Spain), will be proposed.

Further details on the lower Stephanian in France have been prepared by J. Doubinger and P. Vetter for the chapter on the Stephanian in West and Central Europe in 'The Carboniferous of the World'.

R.H.W., C.F.W.P.

WORKING GROUP ON THE DINANTIAN OF WEST AND CENTRAL EUROPE (E. Paproth)

The Dinantian, the lowest series of the Carboniferous system, is subdivided into the Tournaisian and Visean stages (1935, 1967). The definition of the lower boundary of the Tournaisian/Dinantian/ Carboniferous is being studied by the I.U.G.S. Working Group on the Devonian-Carboniferous boundary.

Regional subdivisions of (sub-) stages have been defined in Britain (George & al. 1976), in Belgium (Conil & al. 1983) and in Germany in the area of predominant Kulm facies which covers many parts of central Europe (cf. Paproth, manuscript 1982 to be published by the Subcommission on Carboniferous Stratigraphy); they have been approved by the respective bodies of national stratigraphic commissions.

The British and Belgian subdivisions can be correlated narrowly with one another and with foraminifers (and accompanying flora and fauna) bearing successions of the globe. Their correlation with the central European subdivision is still difficult particularly in a greater middle part of the Dinantian due to the rarety of useful fossils and contrast in lithology/facies. This may change soon, as recent research seems to prove radiolarians as useful stratigraphic guides.

Correlation studies are carried out steadily and carefully by stratigraphers in west and central Europe, using fossils as the most exact toils available for measuring time in this part of the globe. At present, spores, foraminifers and conodonts are particularly useful. Ostracods and megafossils seem to have been more sensitive to environmental influences; this makes them excellent tools for palaeogeographic reconstructions.

Conil & al. (1983): Bio- and lithostratigraphic subdivisions of the Dinantian in Belgium, a review. --Ann. Soc. geol. Belgique, T. 106 Liege (Juin 1983)

George & al. (1976): A correlation of Dinantian rocks in the British Isles. -- Geol. Soc. spec. rep. 7. London

LOCAL STAGES FOR THE CARBONIFEROUS SYSTEM OF AUSTRALIA (J. Roberts)

Local stages have not been formally designated for the Carboniferous System in Australia and most workers use the standard European subdivisions. Correlation with European stages is relatively precise in the Lower Carboniferous because there are well documented 'cosmopolitan' assemblages, particularly brachiopods, bryozoans, trilobites and conodonts, and to a lesser extent goniatites and foraminiferans, within the marine sequences. However, in the Upper Carboniferous, marine faunas are provincial and belong to the Gondwanan zoogeographic province: correlation with European stages is difficult.

Marine faunas may not therefore be the most appropriate group of fossils for an Australia-wide Carboniferous zonation. This may well be provided by spores and pollen from the relatively undeformed Western Australian sedimentary basins. Preliminary details of a zonation have been given by Kemp et al. (1977), and work on this topic is currently being undertaken by Dr. Geoff Playford at the University of Queensland. Until his work is complete, it would be premature to define boundary stratotypes for local stages.

Informal faunal subdivisions of Werrian, Gresfordian and Barringtonian (Jones & Roberts, 1976), which equal Runnegar & Campbell's (1976) Ages 1, 2 and (in part) 3, have been put forward for eastern Australia. These are based on the marine invertebrate faunas, and could become useful subdivisions (stages) providing we can overcome stratigraphic problems at the logical stratotype localities. Their major weaknesses are: 1) they are presently recognizable only in eastern Australia; 2) the Barringtonian of Runnegar & Campbell (1976) encompasses virtually the entire Upper Carboniferous, and for a large part contains non-marine sediments; and 3) spores and pollen are rarely preserved in eastern Australian successions and it would be difficult to correlate these units with stages, based on spores and pollen, from Western Australia.

Local stages, especially in the Upper Carboniferous, would be desirable additions to the stratigraphic classification of the Carboniferous System in Australia, but their definition must await the outcome of more palaeontological (especially palynological) and stratigraphic work.

References:

Jones, P.H. & Roberts, J., 1976. Some aspects of Carboniferous biostratigraphy in eastern Australia: a review. BMR J. Aust. Geol. Geophys., 1:141-151.

Kemp E.M., Balme, B.E., Helby, R.H., Kyle, R.A., Playford, G., & Price, P.L., 1977. Carboniferous and Permian palynostratigraphy in Australia and Antartica: a review. BMR J. Aust. Geol. Geophys., 2: 177-208.

Runnegar, B. & Campbell, K.S.W., 1976. Late Paleozoic faunas of Australia. Earth-Science Reviews, 12: 235-257.

Field and General Meeting in Argentina, 1985

Dr. S. Archangelsky, Buenos Aires (Chairman, working group on the terrestrial Carboniferous of South America), reports good progress on the preliminaries for the organization of the next Field and General Meeting which, for the first time ever, is to take place in one of the countries of Gondwanaland. This will allow SCCS members and other interested parties to gain first hand experience with the problems of Carboniferous stratigraphy in an area of high palaeolatitude and to assess the demands of a worldwide chronostratigraphy capable of serving not only the palaeoequatorial belt but also the vast Gondwana Realm.

The main area of interest for Carboniferous stratigraphy is the Paganzo Basin in west-central Argentina where a purely terrestrial succession in the eastern part of the basin grades westwards into alternating marine and terrestrial deposits. Elements of an east-west cross-section occur in the Pampean Sierras, the Precordillera and the Cordillera Frontal of the Andes, in several hundred kilometres distance.

As a centre for the scientific SCCS sessions, the city of Cordoba is proposed. A provisional programme includes general papers on the Paganzo, Central Patagonia and Tarija basins, a discussion on the Carboniferous-Permian boundary in these basins as well as in the subsurface Chaco-Parana, Buenos Aires and Colorado basins. It is also proposed to prepare a programme on Carboniferous Palaeogeography and Palaeoclimatology. The duration of the scientific sessions would be three days. Displays of fossil collections and literature on the Argentine Carboniferous will be arranged and the following major publications will be available for inspection.

(1) Atlas of Fossil Plants by F. Kurtz (a fully annotated and revised edition of this classical work, including some hitherto unpublished plates).
(2) Atlas of Carboniferous Invertebrates.
(3) Atlas of Carboniferous and Permian Plants.
(4) An annotated bibliography of the Carboniferous in Argentina (comprising c. 800 references).

In view of the distances to be covered and logistic difficulties a field trip of a minimum of seven days and a maximum of ten days is being planned. This includes several classical sections, e.g. the Rinconada section visited by Du Toit. All the sections contain floral remains and two provide the opportunity for collecting marine fossils (Levipustula and Cancrinella faunas).

Additional field trips to Patagonia and Tarija (partly in Bolivia) may be arranged for those wishing to stay longer than a fortnight.

Dr. Archangelsky will provide further details at the General Assembly in Madrid.

R.H.W.

Carboniferous - Permian Boundary Working Group

Dr. Charles Ross, Gulf Science and Technology, P.O. Box 36506, Houston, Texas 77036, is now head of a newly revised and reconstituted Carboniferous-Permian Boundary working group, and is in the process of inviting specialists to participate as members in the activities of this body. The working group will be holding two half-day sessions at the XICC in Madrid and also plans to hold meetings on Permian stratigraphy, including the lower boundary of the Permian, in conjunction with the International Geological Congress in Moscow, in 1984. Persons interested in the activities of this working group should contact Dr. Ross.

Devonian - Carboniferous Boundary Working Group

Dr. Maurice Streel, Secretary of the Devonian - Carboniferous Boundary working group, is organizing a boundary symposium, tentatively scheduled for Thursday, September 15, at the XICC in Madrid, concerning the latest data on available stratotypes. Anyone interested in this activity should contact Dr. Streel (Université de Liège, Paleobotanique et Paleopalynologie, B-4000 Liege Belgique).

27th International Geological Congress, Moscow, 1984
August 4-14, 1984

It should be of interest to many Carboniferous stratigraphers and geologists that a number of field excursions being offered in conjunction with the 1984 IGC in Moscow cover areas of particular importance. Among others, field excursions are being offered to the Donbas, Central Asia and to the Southern Urals. The editors (WBS and WLM) attended three similar excursions during the 1975 VIII Carboniferous Congress in Moscow, and report that they provided an excellent opportunity to see these very important successions. Inquiries regarding the IGC should be addressed to "Organizing Committee, 27 IGC, 22 Staromonetry, Moscow, 109180, USSR".

International Union of Geological Sciences, Publications

1980

NO.

1. The Ordovician System in China, by Sheng Shen-fu, 7 p.

2. The Ordovician System in the Near and Middle East, by W.T. Dean, 22p.

1981

3. In Search of the Palaeogene/Neogene Boundary Stratotype, part 1, Potential Boundary Stratotype Sections in Italy and Greece and a Comparison with Results from the Deep-Sea, edited by F. Cati: sponsored by Consiglio Nasionale delle Ricerche, Bologna, 210 p.

4. Carboniferous-Permian Symposium (Proceedings of the IUGS Subcommission on Carboniferous Stratigraphy Field and General Meeting, Turkey, 14-25 May, 1978), edited by E. Demirtask, L.F. Winkler-Prins, & R.H. Wagner.

5. Metalogenesis en Latinoamerica, edited by J.L. Lee Moreno: sponsored by Consejo de Recursos Minerales - Mexico and y el Consejo Consultive de Directores de Servicios Geologicos de Latinoamerica, 361 p.

6. The Ordovician System in Australia, New Zealand and Antarctica, Correlation Chart and Explanatory Notes, 64 p.

7. An Outline of the Marine Triassic in China, by Wang Yi-gang and others, edited by E.T. Tozer, 21 p.

8. Canadian Ordovician, edited by C. Barnes

1982

9. Carboniferous stratotypes of Western Europe, W.H.C. Ramsbottom, ed.

10. The Cambrian-Ordovician Boundary: Sections, Fossil Distributions, and Correlations, edited by M.G. Bassett and W.T. Dean: National Museum of Wales, Geological Series no. 3, Cardiff

11. Ordovician System of the United States, by R. Ross and others

Stratigraphic Subcommission on Carboniferous Stratigraphy Publications

1. Wagner, R.H. (ed.), 1967. Proceedings of the meeting of the Subcommission on Carboniferous Stratigraphy, held in Sheffield, 9th and 10th September, 1965. - Dept. Geol. Univ. Sheffield: 1-168 (cyclostyled; printed in 1980). Obtainable at a price of £9 - (including postage and packing) from Dr. A.C. Higgins, Dept. of Geology, The Univ. , Sheffield, ENGLAND

2. Streel, M. & R.H. Wagner (eds.), 1970. Colloque sur la stratigraphie du Carbonifere. Compte-rendus de la 8e Reunion de la Commission Internationale de Microflore du Paleozoique (C.I.M.P.) et de l'assemblee generale de l'I.U.G.S. Subcommission on Carboniferous Stratigraphy (S.C.C.S.) tenues a Liege, du 13 au 20 avril 1969. - Congres Colloques Univ. Liege, 55: 1-551, 38 pls. Obtainable at a price of $35 from M. Streel, Labor de Paleontologie, Universite de Liege, Place du 20 Aout 16, B 4000 Liege, Belgium, (for North America contact W.B. Saunders, Department of Geology, Bryn Mawr College, Bryn Mawr, PA 19010, U.S.A.)

3. Wagner, R.H. (ed.), 1971. The Carboniferous of Northwest Spain. Account of and papers presented for the International Field Meeting on the Carboniferous of the Cordillera Cantabrica, 19-26 Sept. 1970, organized by the I.U.G.S. Subcommission on Carboniferous Stratigraphy and the Comision Naciona de Geologia. - Trabajos Geologia Univ. Oviedo, 3 & 4: 1-694, 87 pls. Obtainable at a price of $18. - from Biblioteca Inst. Geol. Aplicada, Facultad de Ciencias, Univ. de Oviedo, Oviedo Spain (for North America again contact W.B. Saunders).

4. Holub, V. (ed.), 1973. Carboniferous and Permian of the Bohemian Massif. Excursion guide S.C.C.S. Field Meeting in Czechoslovakia, Ostrava-Brno-Praha, September 17-27, 1973. - Geological Survey, Prague: 1-155. Out of print.

5. Holub, V.M. & R.H. Wagner (eds.), 1977. Symposium on Carboniferous Stratigraphy. IUGS Subcommission on Carboniferous Stratigraphy (SCCS) Field and General Meeting, Czechoslavakia, September 17-27, 1973. - Geological Survey, Prague: 1-471, 32 pls. Out of print.

6. Demirtasli, E. (ed.), 1978. IUGS Subcommission on Carboniferous Stratigraphy Guidebook field excursions on the Carboniferous Stratigraphy in Turkey, May 14-25, 1978. - Maden Tetkik ve Arama Enstitusu, Ankara: 1-46. Out of print.

7. Wagner, R.H., A.C. Higgins, & S.V. Meyer (eds.), 1979. The Carboniferous of the U.S.S.R. Reports presented to the I.U.G.S. Subcommission on Carboniferous Stratigraphy at the 8th International Congress on Carboniferous Stratigraphy and Geology held at Moscow, 1975. - Yorkshire Geol. Soc. Occasional Publ., 4: 1-247, 28 pls. Obtainable at a price of £5 - plus postage and packing from J. Hartley Esq. - Hon. Librarian, Yorkshire Geol. Soc., Dept. Earth Sci., The University, Leeds LS2 U.K. (for North America obtainable for a price of US$15 including postage from Walter L. Manger, Department of Geology, University of Arkansas, Fayetteville, Arkansas 72701

8. Ramsbottom, W.H.C., W.B. Saunders, & B. Owens, (eds.), 1981. Biostratigraphic data for a mid-Carboniferous boundary. (Symposium contributions, Leeds, 1981). Inst. Geological Sciences, Leeds (Obtainable from B. Owens, Inst. Geol. Sci, Leeds LS 158TQ or W.B. Saunders, Dept. Geology, Bryn Mawr College, Bryn Mawr, PA, 19010 U.S.A.)

9. Meyen, S.V. (ed.), 1980 Biostratigrafiya pogranichnykh otlozheny karbona i permi (Trudy Mezhduanarodnykh podkomissy po stratigraphi karbona i permi) (Biostratigraphy of the Carboniferous-Permian boundary beds) (Proceedings of IUGS Subcommissions on Carboniferous and Permian stratigraphy). - Akad. Nank Geol. Inst., Moskva: 1-144.

10. Ramsbottom, W.H.C. (ed.), 1981 Subcommission on Carboniferous Stratigraphy Field Guide to the boundary stratotypes of the Carboniferous stages in Britain, Aug. 25- Sept. 1, 1981 - Inst. Geol. Sci., Leeds: 1-110.

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Dr. Yang Jingzhi, Nanjing Inst. Geol. Palaeont., Academia Sinica, Jimingsi, Nanjing, People's Rep. of China.