The Penn-Permian boundary established on invertebrate criteria (according to several authors) has varied greatly, from the Brownsville Limestone at the base of the Gearyan to the Ft. Riley Limestone in the Chase Group of the Gearyan. Other boundaries have been the Americus Limestone, Neva Limestone, and Cottonwood Limestone, all of the Council Grove Group, as well as the Wrenford Limestone of the Chase Group. Vertebrate criteria has placed the boundary as high as the Carlton Limestone in the Cimarronian Series (Lower Permian). Plant megafossils indicate a boundary at the Neva Limestone in the Council Grove Group. Evidence from palynology places the boundary below the Nolans Limestone in the Odell Shale of the Chase Group, This boundary is approximately 30 feet below the Herington Limestone Member of the Nolans Limestone, which is the Pennsylvanian-Permian boundary suggested by lithology.

3o) ACRITARCHS, SPORES, AND PLANT DETRITUS FROM THE SILURIAN (WENLOCKIAN) WALDRON SHALE OF SOUTHEASTERN INDIANA: A PRELIMINARY ASSESSMENT

Gordon D. Wood

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A well-preserved acritarch and spore assemblage has been recovered from three localities of the Waldron Shale in southeastern Indiana. The acritarchs are referable to nineteen genera: Ammonidinium, Baltisphaeridium, Cymatiosphaera, Dateriocradus, Dictyotidium, Diexallophasis, Duvernaysphaera, Evittia, Gorgonisphaeridium, Leiofusa, Leiosphaeridia, Lophosphaeridium, Melikeriopulla, Micrhystridium Multiplicisphaeridium, Neoveryhachium, Pseudotopus, Pterospermopsis, and Veryhachium. Trilete spores are predominantly laevigate and verrucate, with certain forms referable to Ambitisporites and Synorisporites. Macerates also yielded various types of plant detritus. These entities included tubes with "annular" and "spiral" bands, unbanded tubes, cuticular material, membraneous cellular tissue, and sheets displaying a fibrillar-like construction.

The acritarch suite recovered from these localities differs from similarly-aged North American assemblages in lacking representatives of Domasia and Deunffia. This suggests that previously proposed Silurian microplankton provinces, although principally delineated by climatic variables, may be greatly influenced by other parameters (i.e., local environmental conditions, seaway connections, etc). The presence of secondary land plant characters (i.e., exined spores, cuticular-like material, membraneous cellular tissue, etc.) are interpreted as adaptations for the exploitation of terrestrial (or semi-terrestrial) habitats. The observed diversification of spore types and structural elements are consistent with other pre-Devonian studies.

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4) IUGS WORKING GROUP ON DEVONIAN - CARBONIFEROUS BOUNDARY REPORT

The first meeting of the I U G S working group on the Devonian-Carboniferous boundary was held from August 27 to September 8, 1978.

The field trip started in Gottingen (FRG) and ended in Courtmacsherry (Ireland). An exhibit on the Stockum trenches, now filled, was prepared by O.H. WALLISER, H. GROOS-UFFENORDE, H. UFFENORDE AND W. RIEGEL at Gottingen.

Twenty-two localities were visited in the FRG (Drewer, Oberrodinghausen, Borkewehr-Wocklum, Oese and Rieschcid), Belgium (Evieux-Esneux, Chanxhe, Rivage and Anseremme), France (Avesnelles and Etroeungt), England (Maesbury, Clevedon and the Avon Gorge) and Ireland (Old Head of Kinsale, Rocky Bay, Myrtleville, Marino Point, Nohoval Cove, Ringabella, Minane Bridge and Flathead).

Sections and other explanatory data prepared for the participants are available, upon request, from the secretary.

Sedimentological and biostratigraphical features of sections visited were reviewed during a morning session at Courtmacsherry.

Two correlation charts based on existing information and new interpretations formulated during the excursion were prepared. The charts cover a timespan ranging from the Upper styriacus to the Lower crenulata Zone, zonal reference being related to conodonts.

One chart presents detailed interzonations of different groups of fossils. The other correlates the lithostratigraphic successions.

These correlation charts will be submitted to many specialists for comment and are available, upon request, from the secretary.

One of the major accomplishments of the excursion was the opportunity to compare within a span of ten days depositional environments ranging from bathyal to continental with some rates of sedimentation more than one hundred times greater in some areas than in others. One of the important conclusion is that dicontinuities are obvious or inferrable in almost all of the sections visited.

The members of the working group concluded collectively that:

1) There exists already a general correlation of strata near the Devonian-Carboniferous boundary, although refinement is desirable.

2) The most useful boundary will be one that lies within the span of fully documented continuous evolution of one or, more desirably, several groups of fossils.

3) Because of their abundance and tendency toward ubiquitous occurrence, microfossils offer the best practical guidance in selection of a boundary although megafossils will continue to play an important role.

4) Priority in definition of a boundary is a significant consideration but not a dominant one. The least disruption of the literature is a desirable objective.

Therefore, the working group members resolved that :

1) All specialists who are able to present detailed descriptive, statistical, and distributional data on evolution of a group of organisms in a section on either side of a proposed boundary are invited to provide these summary data for review at the next meeting of the working group (Carboniferous Congress meeting at Washington and Urbana, in May 1979). Circulation of data through the secretary six weeks prior to the meeting will be advantageous.

2) In the expectation that the relevant data will be available in 1979, it is the hope of the working group that a recommendation to the International Commission on Stratigraphy can be formulated at an early date.

IUGS working group on the Devonian-Carboniferous boundary

Secretary address : M. STREEL, Paleontology, the University,
7, place du 20 Aout, B-4000 LIEGE, Belgium.

Report of Field Meeting from Germany to Ireland

27th August - 8th September 1978

Sunday 27th August 1978.

Geological-Palaeontological Department and Museum of the Georg-August University, Goldschmidt Str. 3, D 34 GOTTINGEN.

1) An exhibit had been prepared by the Gottingen Staff on the Stockum Limestone from the now filled trenches at the Stockum locality. The relation of this limestone at Stockum with the goniatite reference section at Oberrodinghausen was explained : O, WALLISER thinks that the first goniatites occur within bed 6 of VOHRINGER 1960 (from bed 3 of ZIEGLER 1971) rather than from the base of this bed.

From a discussion held in the Geological Department, several opinions arose which were rediscussed during the Courtmacsherry session and therefore are not reported here. H. GROOS-UFFENORDE remarked that sections containing several groups of fossils were rarely recorded on the D/C boundary as compared with other stratigraphical levels like the Lower/Middle Devonian boundary. M. HOUSE noted that a D/C boundary reference section in a facies which should not allow correlations with the Old Red Facies, should be rejected.

H. HOLLARD and B. MAMET reported on possible sections respectively available in Morocco and Alaska.

Monday 28th August.

Drewer quarry.

2) This section originally studied by H. SCHMIDT, has recently been resampled for Conodonts by C. CLAUSEN and K. LEUTERITZ on both sides of a grey-greenish shale unit (n° 12) on the NE wall of the quarry where it is thinning to nothing. The results are not yet available but could be imporant as the D/C limit has traditionally been drawn within this unit at Drewer. Note however that this shaley unit is thicker on the NW-wall of the quarry and could there include nodular limestones missing on the NE wall.

G. HAHN showed typical trilobites from the shaley unit n° 7, also containing the Conodont Crenulata zone. He assumed a Phacops specimen found for the first time in this quarry to have fallen from layers corresponding to the top of the Devonian. He emphasized differences between Limestone facies and Culm facies trilobites.

Tuesday 29th August.

Borke-Wehr by Wocklum, Oberrodinghausen and Oese sections.

The small old quarry at Borke-Wehr by Wocklum is the type locality of DENCKMANN'S "Wocklumer Kalk. The Hangenberg Schiefer is here 1 m.5 thick.

Oberrodinghausen is the reference section for the Goniatite zonation which serves to delineate the Heerlen 1935 base of the Carboniferous system.

W. ZIEGLER explained the new conodont evidences in this and other related sections. The boundary between the Lower and Middle costatus is below the base of Wocklumeria. The Hangenberg Schiefer dont contain carbonates at Oberrodinghausen and therefore have no conodonts; Siphonodella sulcata is present there in bed n° 1; O. WALLISER assumes Goniatites to occur only in bed n° 3, S. duplicata occurs in bed n° 5, 15 contimeters higher. S. praesulcata (with a Lower Protognathodus Fauna) is present below S. sulcata at Oese at the top of a rather thick (27 meters) Hengenberg Schiefer-Sandstein sequence, but the Hangenberg Kalk has no Gattendorfia.

3) In conclusion, there is nowhere in that region any published available section where the first occurrence (in a succession) of S. sulcata can be
4) compared with the Gattendorfia first occurrence. A borehole crossing an unweathered Hangenberg-Kalk at Oberrodinghausen is planned and hoped for soon. Oberrodinghausen railway cutting was the reference section of the BALVIAN Stage (Lower limit at the base of the Hengenberg Kalk) defined by H. SCHMIDT in 1971. Published data on the Seiler and Stockum now filled trenches do not help in showing only a succession of Lower and Upper Protognathodus faunas. The known relations between Siphonodella and Protognathodus biofacies were explained by C.A. SANDBERG.

M. STREEL emphasized the importance of one of the unpublished Seiler
5) sections where the first representative of the miospore Verrucosisporites nitidus is found with a Lower Protognathodus fauna, allowing comparison with the Irish spore zonation (LN zone). Contacts were made by W.ZIEGLER with the Iserlohn Municipality in order to open a new trench at Seiler.

Wednesday 30th August.

Riescheid railway cutting.

A section in an area near the shelf/basin border, with a rather thick sequence of Hangenberg Schiefer including a decimeter thick sandstone a layer, one meter below the top. H.R. LANE & W. ZIEGLER demonstrated the unnamed overlaying limestone to belong to the Upper Crenulata-isosticha zone. M. STREEL found a PLs 2 spore subzone in 7 meters from the Hengenberg Schiefer and emphasized the first occurrence of
6) H. explanatus from the highest sample below the sandstone layer allowing comparison with the Irish spore zonation (LE zone*).

A rich unpublished trilobite fauna was demonstrated from this section by C. BRAUCKMANN.

Thursday 31st August

Evieux rail cut, Chanxhe and "Rivage gare" sections.
Anseremme section.

Evieux railway cutting has pre-lepidophytus spore assemblage (VU zone)
7) and ostracod assemblages. CHIJOVA claimed this level to belong to her "Carboprimitia turgenevi-Maternella hemisphaerica" zone, which occurs in the Turgenev beds in USSR. M.J.M.BLESS and J. THOREZ respectively demonstrated the Ostracod-facies relationship and the local sedimentology.

Chanxhe section has the spore VU and PL zones and within the last zone, the first occurrence of the foraminifera Quasiendothyra kobeitusana. The first occurrence of Q. kobeitusana is better argumented in the Tohogne borehole, southward near the Ourthe valley. The top of Chanxhe section is faulted but the sequence is complete at "Rivage gare" reaching the Schiste du Pont d'Arcole of Middle Tournaisian age and higher horizons.

Conodonts are rare in these sections. Bispathodus ultimus of Chanxhe, bed 111 has later revealed to be an Icriodus and therefore the relations of these lateral equivalents of the Etroeungt Limestone with the Wocklumeria Kalk (Middle and Upper costatus zone) become questioned.

Other exposures in the Ourthe valley show limestone beds with a Costatus zone in VU spore zone*. Therefore the PL zone is clearly incoming within the Costatus zone.

An introduction to the Anseremme railway cutting were given by J. BOUCKAERT and M. VANSTEENWINKLE when stopping for lunch in the small village called Ocquier.

The most important new information was the first occurrence of Siphonodella duplicata in bed no. 172, but J. BOUCKAERT emphasized also the occurrence of the ostracod Pseudoleperditia ("Bernia") vemilaea in approximately the same horizon (bed no 174) which should allow comparison with the Malerka Horizon in USSR, according to CHLUPAC. M. VANSTEENWINKLE splendidly demonstrated a very shallow water succession starting from bed no 161 upwards. Conodonts in such an environment were supposed to be redeposited.

J. BOUCKAERT also reported the important discovery of a presumed ancestor of Patrognathus variabilis in the $C^{t}_{1}a_{2}$ zone of the Donetz basin in USSR, called P. bombassicus (nomen nudum). This species is there believed to characterise a new conodont zone between the costatus zone and the gulcata zone. A major gap was therefore supposed near the base of the Calcaire d'Hastiere, at Anseremme. Part of this demonstration was opposed by C.A. SANDBERG who recognised on "P. dombassicus" photographs a new species that he and W. ZIEGLER recently identified as Patrognathus nov. sp. in a lateral biofacies of the Lower Costatus zone. C.A. SANDBERG rather inferred the existence of a larger gap at Anseremme on the discovery of a Lower Costatus fauna near the top of the Etroeungt equivalent (bed no 148), two meters below an uppermost Devonian Pelekysgnathus assemblage containing Protognathodus kockeli in the basal bed (no 159) of the "Calcaire d'Hastiere" sensu Conil. Such a large gap is in contradiction with a long tradition of considering the Calcaire d'Etroeungt as a lateral equivalent of the Wocklumer Kalk. The implications were not really discussed at Anseremme and are therefore reported as comments on the biostratigraphic charts.

Between beds no 159 and 160 t is the lower limit of the HASTARIAN stage as defined by CONIL et al. 1976

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*This has been checked again, after the excursion, at Beverire section by E. GROESSENS.

Friday 1st September

Avesnelles rail cut and Etroeungt quarry.

Most of the discussion at the Avesnelles rail cut turned around the first occurrence of Quasiendothyra kobeitusana subsp. kobeitusana which has been published to income in bed 146 (term q) by MAMET, MORTELMANS & SARTENAER 1965, in bed 136 (term o) by CONIL & LYS 1971.

A short text (read by E. GROESSENS) accompanied by photographs, was sent by R. CONIL who claims that many specimens from bed 135 (term n) have almost all characters of this species but 12 instead of 14-17 loci - B. MAMET disregards these last specimens as true Q.kobeitusana kobeitusana but remarks that he never collected any material between 146 and 135. Attendants feel that a compromise could be reached and therefore M. LYS resampled levels 135, 136 and one level (135/136) in between in order to submit this material to russian specialists for comparison with their concept of typical Q. kobeitusana kobeitusana*

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*(Twenty-two slides containing forams have been cut from this material since the excursion. Arbitrarily labelled, they are submitted for reporting to Drs. CONIL, MAMET and REITLINGER, with additional material of their own these specialists would like to demonstrate).

The Calcaire d'Etroeungt type locality was visited in the afternoon.
13) Most of the attendants regret the lack of up to date macrofaunal studies of this famous quarry.

Saturday 2nd September

The party travelled from Maredsous in Belgium to Bristol (UK).

Sunday 3rd September

Naesbury railway cutting, Clevedon beach and Avon Gorge.

The Maesbury railway cutting, in the Mendip Hills, is the most southern section available on the shelf at Early Carboniferous time. Altogether with the Clevedon beach section, they offer poorly dated Lower Limestone Shale units (Advanced Siphonodella zone) and higher horizons.

Part of the Shirehampton beds at the Avon Gorge dated by spores (VI zone) was visited but the available time didn't allow a study of the contact with the Portishead beds, known to carry a PL assemblages of spores and therefore the transitional Devonian/Carboniferous sediments were seen nowhere in Britain.

Monday 4th September

The party travelled from Bristol (UK) to Courtmacsherry in Ireland.

Tuesday 5th and Wednesday 6th September

Old Head of Kinsale, Rocky Bay, Myrtleville, Marino Point, Novohal Cove and Flathead.

Most of the visited sections belonged to the South Munster late Devonian-Carboniferous basin, which accumulated exceptionally thick shallow marine terrigeneous deposits generally containing spores but
14) also locally megafauna (Goniatites, Brachiopods) which have been sampled by participants with the hope of better correlations.

These sediments are subdivided in a Devonian Old Head Sandstone Fm, and a Carboniferous Kinsale Fm. The boundary between these formations at Old Head of Kinsale does constitute the base of the COURCEYAN Stage (GEORGE et al. 1976).

The first incoming of zonal (Siphonodellids) conodonts occurs in the overlying Courtmacsherry Fm.

The underlying undifferentiated Old Red Sandstone has a diachroneous
15) top which according to the locality ranges from LL to LN spore zones. (The O.R.S. ranges into the Carboniferous VI spore zone at Hook Head, a locality of South-east Ireland which was not visited).

Most of the biostratigraphy in this region is thus relying on a spore zonation which partially match the West german spore zonation. 840 meters of Old Head Sandstone (at Old Head of Kinsale) are the lateral equivalent of a few meters or less of Hangenberg Schiefer in Germany.

The LN/VI boundary (base of the COURCEYAN) corresponds to "an abrupt change in lithology whose sedimentological implications need to be understood in case they reflect gaps in the record". Its exact time equivalence with the comparable abrupt changes at the base of the German BALVIAN or the Belgian HASTARIAN has still to be demonstrated.

Thursday 7th September

The first official meeting of the IUGS working group on the Devonian-Carboniferous boundary was held at Courtmachserry Public House at 10. am (Chairman : E. PAPROTH).

"Ordre du jour" : 1) Review and comments on the visited exposures.
2) Boundary problems
3) Next meetings.

1) The prominent characters of each section were reviewed by the Secretary and discussed. Most are pointed with number (1) to (17) in this report. Two correlation charts, one biostratigraphical, one lithostratigraphical based on the evidences shown during the field trip, arose from these and later discussions. These documents were made self explanatoring so that they can be distributed separately.

2) The Chairman first recalled the recommendations of the Subcommission on Carboniferous Stratigraphy expressed during the 7th Carboniferous Congress at Krefeld (1971). Each participant who marked at Krefeld his agreement on these recommendations and was also present at Courtmacsherry brought again his support. It was also noted that Porf. REITLINGER, although admitting a lower boundary to be better defined using foraminifers, clearly joined, in a recent paper*, the above agreement that the base of Gattendorfia subinvoluta approximately matches limits in a majority of fossil groups.

There was a discussion about the kind of taxonomic level to be used to characterise the boundary. W. ZIEGLER would accept a taxon below the generic level but B.F. GLENISTER argued in favour of a definition at the population level in a continuum. Several groups of fossils were then reviewed keeping in mind whether or not they would be acceptable for quantification but also which kind of geographical or facies restrictions they imply.

* The Devonian-Carboniferous Boundary at the Present State of knowledge. Voprosy Micropaleontologii, 20, 1977. A rough french translation of this russian text is available from the secretary on request.

Finally remembering that each proposed regional boundary stratotype (BALVIAN, HASTARIAN, COURCEYAN) which approximates the first incoming of Gattendorfia subinvolute level, are based on sedimentary discontinuities, M. STREEL proposed to slightly move away from these discontinuities : use for instance the first incoming of Siphonodella duplicata, fifteen centimeters higher than the first G. subinvoluta (sensu WALLISER) within the Hangenberg Kalk at the Oberrodinghausen historical section.

At that point of the discussions, the participants did not consider themselves to be entitled to reach any decision before having received the opinions from non-attending working group members as well as from other concerned researchers. It was decided then to diffuse as widely as possible a short report with a few statements inviting specialists to provide new data at the next working meeting. A copy of this short report was sent for publication to LETHAIA and later to EPISODES.

3) The next meeting of the working group is planned during the Carboniferous Congress at Washington on Thursday 17th and Friday 18th May 1979 (two half days ?). The party will leave for St Louis on Friday night and has a one day and half exxursion trip in the Mississippi valley on Saturday 19th and Sunday 20th joining Urbana on Sunday night. Specialised symposia and discussion groups will be arranged between Monday 21st and Friday 25th of May.

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5) Forthcoming meetings of other organisations

a) PALAEOBOTANICAL SYMPOSIUM, OTTAWA 1979

A symposium on the theme 'Landmark events in the evolution of plants' will be held at Carleton University, Ottawa, Canada, on Thursday June 21 1979. The symposium is sponsored by the Canadian Botanical Association (CBA) and the Canadian Association of Palynologists, and will be part of the programme of the 14th A annual meeting of the CBA. Early evolution of land plants, origin and evolution of conifers and the early evolution of conifers will be among the topics to be presented. Further information can be obtained from Dr D. McGregor, Geological Survey of Canada, Ottawa, Ontario, K1A OE8.

b) 26th INTERNATIONAL GEOLOGICAL CONGRESS, PARIS 1980

The first centenary of the Congress meets from July 7 - 17 in the Centre International de Paris - Palais des Congres. The Congress excursions date from June 27 to July 5 and from July 19 to July 27 inclusive. Further details can be obtained from the Secretary General, 77 rue Claude Bernard, 75005 Paris, France.

c) SECOND INTERNATIONAL CONGRESS OF SYSTEMATIC AND EVOLUTIONARY BIOLOGY, VANCOUVER 1980

This will take place at Vancouver from July 17 - 24 on the campus of the University of British Columbia. There will be two plenary session and 12 ½ day symposia: four of these arelikely to be of particular interest to palaeobotanists - origins and evolution of the North Pacific biota, evolution of reproductive strategies, green algae and land plant origins, palaeobiology of the Pacific rim. Further details can be obtained from Dr G Scudder, Department of Zoology, University of British Columbia, 2075 Westbrook Mall, Vancouver, B.C. V6T 1W5, Canada.

d) LES CHITINOZOAIRES ET STRUCTURES CHITINOIDES VOISINES DU PALEOZOIQUE - RELATIONS PALEOMYCOLOGIQUES, PARIS 1980

Objet du Colloque :

Affinites fongiques actuelles et fossiles des Chitinozoaires ou Chitinomycetes et autres organismes chitineux incertae sedis du Precambrien terminal au Devonien.

Date : en Juillet 1980.

Duree : 1 jour d'exposes, 1 jour de discussions et demonstrations.

Organise par : Laboratoire de Micropaleontologie, Ecole Pratique des Hautes Etudes, 8 rue de Buffon, 75005 Paris, France.

Le Colloque aura lieu a cette adresse. Pas de droits d'inscription.

Exposes introductifs par Philippe TAUGOURDEAU et Marcel LOCQUIN. Ces exposes seront suivis des communications des participants, ouvertes a la discussion de tous.