THE LOWER FAMENNIAN AT THE SOUTHEASTERN BORDER OF THE DINANT BASIN (*)

par Michiel DUSAR (**)  

(3 figures dans le texte)

RéSUMé

L'étude stratigraphique des dépôts sédimentaires du Famennien inférieur dans la partie sud-orientale du bassin de Dinant a permis de préciser ses limites inférieure et supérieure et de comparer les zonations à conodontes et à rhyncho nellidés, dont le diachronisme est bien marqué mais stable. La limite supérieure du Famennien inférieur, basée sur la transition crepida-rhomboidea dans la zonation à conodontes, est précédée de peu par l'installation du facies d'Esneux, caractérisé par une association de rhyncho nellidés avec Basilicorhynchus. La limite Frasnien-Famennien est marquée dans la lithologie par une augmentation temporaire du contenu gréseux, et dans la paléontologie par un changement de faunes (conodontes, rhyncho nellidés, tentaculites). La Zone à triangularis inférieure, à la base du Famennien, équivaut probablement la partie basale de la Zone à triangularis moyenne.

Abstract

A stratigraphical study of Lower Famennian deposits at the southeastern border of the Dinant tectonic basin allowed a comparison of the conodont and the rhyncho nellid biozination which showed the diachronism between these fossil guide groups. The lower and upper boundaries of the Lower Famennian substage are defined. The conodont distribution at the Frasnian-Famennian transition is discussed along with the value of the Lower triangularis conodont - Zone.

I. INTRODUCTION

A stratigraphical study of the Lower Famennian strata in the region of Hamoir (eastern border of the Dinant tectonic basin) is mainly based on the study of two fossil groups, the conodonts and the rhyncho nellidés. The stratigraphic succession of the rhyncho nellidés established by SARTENAER, has been recognized in all sections studied. The standard Upper Devonian conodont zonation originally established in Germany by ZIEGLER, has been recognized and specified in Belgium by COEN and MOURAVIEFF for Frasnian deposits and by BOUCKAERT and co-workers for Famennian deposits. Rich conodont faunas in the section studied allowed a detailed subdivision of the Lower Famennian strata to be made.

A correlation between the conodont and the rhyncho nellid succession is shown in fig. 1. A certain diachronism between conodonts and the lithological units reflected by the rhyncho nellidés is evident. This is due to distribution differences between the

(*) Communication présentée le 18 mai 1976, manuscrit déposé le 18 août 1976.  
(**) Katholieke Universiteit Leuven, Instituut Aardwetenschappen, Redingen­straa 16, B-3000 Leuven.
fossil groups. The standard conodont succession is recognized world-wide, although species frequencies are influenced by local facies conditions. The rhynchonellid distribution is more directly controlled by geographical restrictions and facies conditions, at least at the species level. However, stable facies conditions during the Lower Famennian in the area studied impose only minor divergencies between conodont and rhynchonellid zone limits. Compared to the Lower Famennian conodont zonation, the installation of a new facies or the appearance of some new rhynchonellid species is generally recorded earlier in the north which is considered as more shallow and littoral, than in the south.

An important interruption in the faunal content at the Frasnian-Famennian stage limit is also reflected by a sudden change in the conodont frequency distribution pattern at the form genus and species level, which is not without implications for the biozonation. This interruption is also perceptible in the lithofacies.

II. LOCALITIES

All data come from the southeastern part of the Dinant tectonic basin. Observations from other areas are only confirmatory (Hony in the northeastern part; Houyet in the southern part and Silenrieux-Cerfontaine in the northwestern part of the Dinant basin).
Data from the Sinsin-Haversin area have been given by Dreesen and Dusar, 1975 and by the Guidebook Excursion I-4 of the International Symposium on Belgian micropaleontological limits, Namur 1974, eds. Bouckaert and Streel. Data from the Noiseux section (16E 25-26) by the Namur Symposium Guidebook, Exc. 1-5. Data from the Somme-Leuze borehole by Bouckaert and Herman, 1973. Data from the Hamoir area by the Namur Symposium Guidebook Exc. 1-7 and in unpublished descriptions of numerous outcrops on sheets Hamoir, Ferrières, Grand Han, stored in the Archives of the Belgian Geological Survey.

III. THE LOWER-UPPER FAMENNIAN SUBSTAGE LIMIT (Fa1/Fa2)

The Lower-Upper Famennian limit is drawn at the base of the rhomboidea conodont-Zone (Bouckaert, Streel and Thorez, 1968), which was correlated by the same authors with the limit between the Mariembourg and Esneux Formations ("assises") as described by Gosselet and Mourlon.

The base of the Basilicorhynchus basilicus gerardimontis-Zone which in the sections studied is immediately preceded (Aye 356 b = Tige de Hogné) or followed (Hamoir) by the appearance of Evanescirostrum alblinii, and followed by the appearance of the "Camarotoechia" letiensis group, occurs in the upper part of the Upper crepida-Zone which is still situated in the Lower Famennian. In some sections such as Haversin Les Basses, Hamoir Néblon 158W 763 (Namur Symposium Guidebook, Exc. 1-8) and 158W 60 = li, this base occurs in an interval-zone without Palmatolepis crepida and before the appearance of P. rhomboidea.

It is associated with a gradual increase of psammitic sandstone beds indicating the Esneux Formation which remains predominantly shaly. In this way, a parallelism of the base of the Esneux lithofacies with the base of the Basilicorhynchus basilicus gerardimontis-Zone is preferable.

In the region of Haversin, two different facies were observed in the Upper crepida-Zone: a northern sandy facies (Esneux type) with Basilicorhynchus and associated rhynchonellids (Cavatisinurostrum faniae, Evanescirostrum and "Camarotoechia" letiensis) in Les Basses comparable to the facies of the Hamoir region; a southern shale facies (Mariembourg type) with Ptychomalectoechia dumonti associated with Evanescirostrum without Basilicorhynchus in Tige de Hogné. This clearly shows the relation between rhynchonellid associations and facies, and the diachronism with the conodont biozonation (Dreesen and Dusar, 1975).

A formal subdivision of the Lower Famennian shales in two units, the "assise de Senzeilles" with Ptychomalectoechia omaliusi and the "assise de Mariembourg" with P. dumonti, is not practicable in the area studied. No important differences in lithofacies were discovered, while the beds containing the two guides form only a minor part of the complete Lower Famennian succession.

IV. THE FRASNIAN-FAMENNIAN STAGE LIMIT

The limit at the base of the Famennian stage is drawn at the base of the triangularis conodont-Zone in conformity with the proposition by Bouckaert et al (1972) at the Hony reference section. Limits based on other fossil groups are found at the same level. The first appearance of Pampociliarhynchus praenueux and P. lecomptei is nearly simultaneous with that of Palmatolepis triangularis. This limit is evident
in all parts of the Dinant tectonic basin, especially in its southeastern part. It is however too clear-cut and too uniform, resulting obviously from some widespread disturbances tectonic or otherwise, with impact on sedimentation and biofacies. At the top of the Frasnian deposits and continuing into the lowermost Famennian strata, numerous lenticular and nodular calcpsammitic beds were seen (more clayey limestone in southern sections such as Noiseux and Sinsin). They separate the two stages in which the shales are rather similar (Barvaux type, SARTENAER 1974). A new fauna appears together with this facies change, as illustrated by conodonts and rhynchonellids, whereas other faunas vanish such as the tentaculites which were recovered from heavy residues of dissolved limestones. Some solitary corals are still observed in the Barvaux type shales just below the installation of the new facies with calcpsammitic layers (Hamoir 158W 143). Rare dwarfish forms of solitary corals reappear in the Upper Famennian from the Esneux beds upwards (Hamoir 158W 855, top rhomboidea-Zone).

The sudden change in the conodont frequency distribution is well illustrated by two sections already published in the Namur Symposium Guidebook, Noiseux (Exc. 1-5) and Hamoir-Xhignesse (Exc. 1-7) (figs. 2-3).

Fig. 2. — Frequency distribution in % of some conodont form-genera in the Noiseux section (Guidebook Namur, 1-5); on the left side sample numbers.

1-5 : Upper gigas-Zone
6-21 : Middle triangularis-Zone
22-25 : Upper crepida-Zone
26-30 : Lower crepida-Zone
31-34 : Middle crepida-Zone

Ancyrodella, Ancyrognathus in its Frasnian forms and the Palmatolepis subrecta group disappear completely at the Frasnian-Famennian boundary (boundary between nos. 5 and 6 at Noiseux, between nos. 4 and 5 at Xhignesse). They are replaced by representatives of the Palmatolepis triangularis group and especially by an outburst of Icriodus which makes up nearly 50 % of the total conodont fauna in some beds. Icriodus is considered as an indicator for shallow water facies (SEDDON and SWEET,
1971). The proportion of *Icriodus* diminishes gradually in younger strata and reaches a minimum in the crepida-Zone.

Noiseux on a more southern position and less sandy in facies, has yielded proportionally more Palmatolepids (15 % in the south to 8 % in the north) and less Icriodids (± 30 % to ± 40 %).

The Uppermost *gigas-Zone* known in Germany, is lacking in Belgium, or is incorporated in the upperpart of the *gigas-Zone*. Its guide *Palmatolepis linguiformis* has never been recorded as a result of the less favorable facies.

The Lower *triangularis-Zone* as it is recognized in different Belgian sections (association of *Palmatolepis triangularis* without *P. delicatula* nor Frasnian forms) probably equals the German Middle *triangularis-Zone*. This is due to a delay in the appearance of *Palmatolepis delicatula* which indicates the Middle *triangularis-Zone*. This delay is not observed in the Noiseux section where conodonts and especially the Palmatolepids are more abundant at these levels. Hence a higher probability in the Noiseux section of finding specimens of a new species normally rare at the point of first appearance.

This interpretation could have some implications for an international correlation of these strata. However these may be few because of the extreme shortness of the time-span involved.

V. CONCLUSIONS

In the area studied, differences resulting from diachronism between conodont and rhynchonellid zones remain rather minor during the Lower Famennian. Each zonation can be substituted for by the other without too many stratigraphical problems.

The Lower-Upper Famennian limit is somewhat preceded by the Famenn-Esneux lithostratigraphical limit. The value of the Lower *triangularis-Zone* at the base of the Famennian stage in Belgium is questionable.
ACKNOWLEDGEMENTS

I am especially grateful to Prof. J. Bouckaert who guided this work which was also partially discussed with M. Coen, R. Dreesen, A. Mouravieff and Prof. M. Streel. P. Sartenaer helped with rhynchonellid determinations. Prof. G. King and D. Daly corrected the manuscript. Prof. F. Geukens kindly enabled this study.

BIBLIOGRAPHY


