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MIOSPORES FROM THE TYPE LOCALITY OF THE MIDDLE FAMENNIAN ESNEUX FORMATION IN THE OURTHE VALLEY, EASTERN BELGIUM1

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(2 figures & 2 plates)

ABSTRACT. At the type locality of the Esneux Formation, a 8 m thick claystone interval is present in the upper part of the formation a few metres below nodular limestones of the Souverain-Pré Formation containing an early *marginifera* conodont fauna. Samples from the claystone contain an assemblage of miospores which can be referred to the early part of the (GF) *gracilis-famenensis* Zone which in the area underlines the late Famennian (VCo) *versabilis-cornuta* Zone. The early character of the GF Zone is shown by the occurrence in almost all the samples, of typical specimens of *Grandispora famenensis* (var. *famenensis*) and specimens with reduced ornamentation, identified as *G. famenensis* var. *minuta* in Byelorussia. This latter taxon is unknown in younger lithological formations in Belgium. The first occurrence of this last variety is found in the *Cornispora varicornata* assemblage-acme Zone of Byelorussia (base at the Eletz/Petrikov limit) the lower part of which is there correlated with the conodont *rhomboidea* Zone. The first occurrence of *G. famenensis* appears thus as a good marker for long distance correlation.

KEYWORDS: miospores, middle Famennian, eastern Belgium, Byelorussia.

RESUME. Miospores de la localité type de la Formation d'Esneux, Famennien moyen de la vallée de l'Ourthe, dans l'Est de la Belgique. Dans la localité-type de la Formation d'Esneux, une couche de schiste, épaisse de 8 m, est présente dans la partie supérieure de la formation, quelques mètres en-dessous d'un calcaire nodulaire contenant une faune à conodontes *marginifera* ancien. Des échantillons de ce schiste contiennent un assemblage de miospores qui peut être assimilé à la partie précoce de la Zone (GF) *gracilis-famenensis* qui, dans la région, précède la Zone (VCo) *versabilis-cornuta* d'âge Famennien tardif. Le caractère précoce de la Zone GF est démontré par la présence, dans la plupart des échantillons, à côté des spécimens typiques de *Grandispora famenensis* (var. *famenensis*), de spécimens portant une ornementation réduite (identifiés comme G. *famenensis* var. *minuta* en Biélorussie), inconnus dans les unités lithologiques plus jeunes en Belgique. L'apparition de cette dernière variété en Biélorussie se situe dans la zone d'assemblage-acme *Cornispora varicornata* dont la base est à la limite entre les Horizons d'Eletz et de Petrikov et dont la partie inférieure est corrélée avec la Zone à conodontes *rhomboidea*. La première apparition de G. *famenensis* semble donc être un bon marqueur pour des corrélations à longue distance.

MOT-CLES: miospores, Famennien moyen, Est de la Belgique, Biélorussie.

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1. INTRODUCTION

The Ourthe valley is the type area where, in 1882, Mourlon subdivided the Famennian Stage. During the last 25 years, the middle and late Famennian of this area has been intensively studied by Thorez and collaborators.

The Esneux Formation is the lowest formation of the mostly silty and sandy lithostratigraphic group named «Psammites du Condroz» (middle and late Famennian) and overlies the shaly «Schistes de la Famenne» (early Famennian). The Esneux Formation is succeeded by the nodular limestones of the Souverain-Pré Formation. At the type locality of Esneux village (fig. 1), a 8 m thick claystone unit is present in the upper part of the Esneux Formation (fig. 2), a few metres below the nodular limestones of the Souverain-Pré Formation. These limestones contain the early *marginifera* conodont Zone (Bouckaert *et al.*, 1971, Bless *et al.*, 1974 and Dreesen *et al.*, 1986). This section was investigated many years ago in an attempt to characterize the assemblage of miospores of the Esneux Formation (Bouckaert *et al.* 1968, 1971, Becker *et al.* 1974 and Bless *et al.* 1974). The sampling then focused only on the siltstone and sandstone part of the sequence and resulted in the definition of the (GH) *gracilis-hirtus* Zone (Bouckaert *et al.* 1971 and Becker *et al.*, 1974).

During a recent visit by two of us (V.A. & M.S.) to the type locality at Esneux Village in 1991 sampling was undertaken in the claystone part of the sequence between the overlying limestones and the previously investigated siltstone-sandstone sequence in order to refine the position of the limit between the (GH) *gracilis-hirtus* Zone and the succeeding (GF) *gracilis-famenensis* Zone. The latter zone, recently renamed by Streel et al. 1987, was known from the Comblain-la-Tour Formation (Bless *et al.*, 1974), 32 m above the nodular limestone of the Souverain-Pré Formation in the same valley. Another aim of the study is to compare the miospore assemblage with possibly similar assemblages in Byelorussia.

2. DESCRIPTION OF THE MIOSPORE ASSEMBLAGE

Six samples (9 to 14) were collected and processed from the 8 m thick claystone interval. Two samples (2 and 4) were remacerated from the previous collection in the siltstone-sandstone interval. All the samples yielded very brown, sometimes almost black, miospores. They also contain acritarchs which are generally better preserved than the miospores. The most important miospore taxa for stratigraphy are listed and their distribution within the samples is shown (fig. 2). All these taxa, but two,

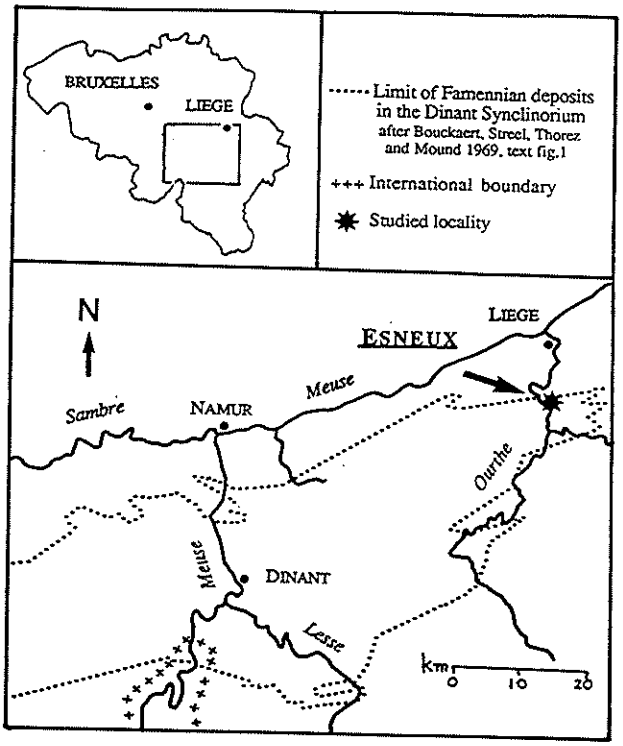

Figure 1. Localisation of Esneux village in the Ourthe valley, eastern Belgium.

are present in almost all samples, including the typical *Samarisporites* sp. cf. *Acanthotriletes hirtus* in Becker *et al.* 1974 (characteristic of the GH Zone).

Of particular interest are two taxa known only from the upper half of the section. There are two varieties of *Grandispora famenensis,* (1) a distinctive species bearing mammillate ornaments, *G. famenensis* var. *famenensis* which first appears in sample 13, just above the base of the claystone bed and (2) *G. famenensis* var. *minuta*, a variety with reduced ornamentation which appears at sample 4, 11 m below sample 13. Of course, the sampling below sample 14, at the base of the claystone bed, is too scarce to allow an accurate limit for the inception of *G. famenensis* var. *minuta* to be established. The rare miospores recorded in the siltstone 4 indicate that this lithology is not suitable for miospore fossilisation and preservation. Indeed the occurrence of *G. famenensis* var. *minuta* was not noted in the previous investigation of that sample. However sample 2, taken in a claystone bed almost 14 m below sample 4, is rich in miospores and lacks any varieties of *G. famenensis.* Therefore, we have to conclude that the first appearance of *G. famenensis* is to be found in the interval between samples 4 and 2. This first occurrence and the absence of the index species of the succeeding (VCo) *versabilis-cornuta* Zone suggest that the base of the (GF) *gracilis-famenensis* Zone has to be lowered to at least the level of sample 4 in the upper part of the Esneux Formation.

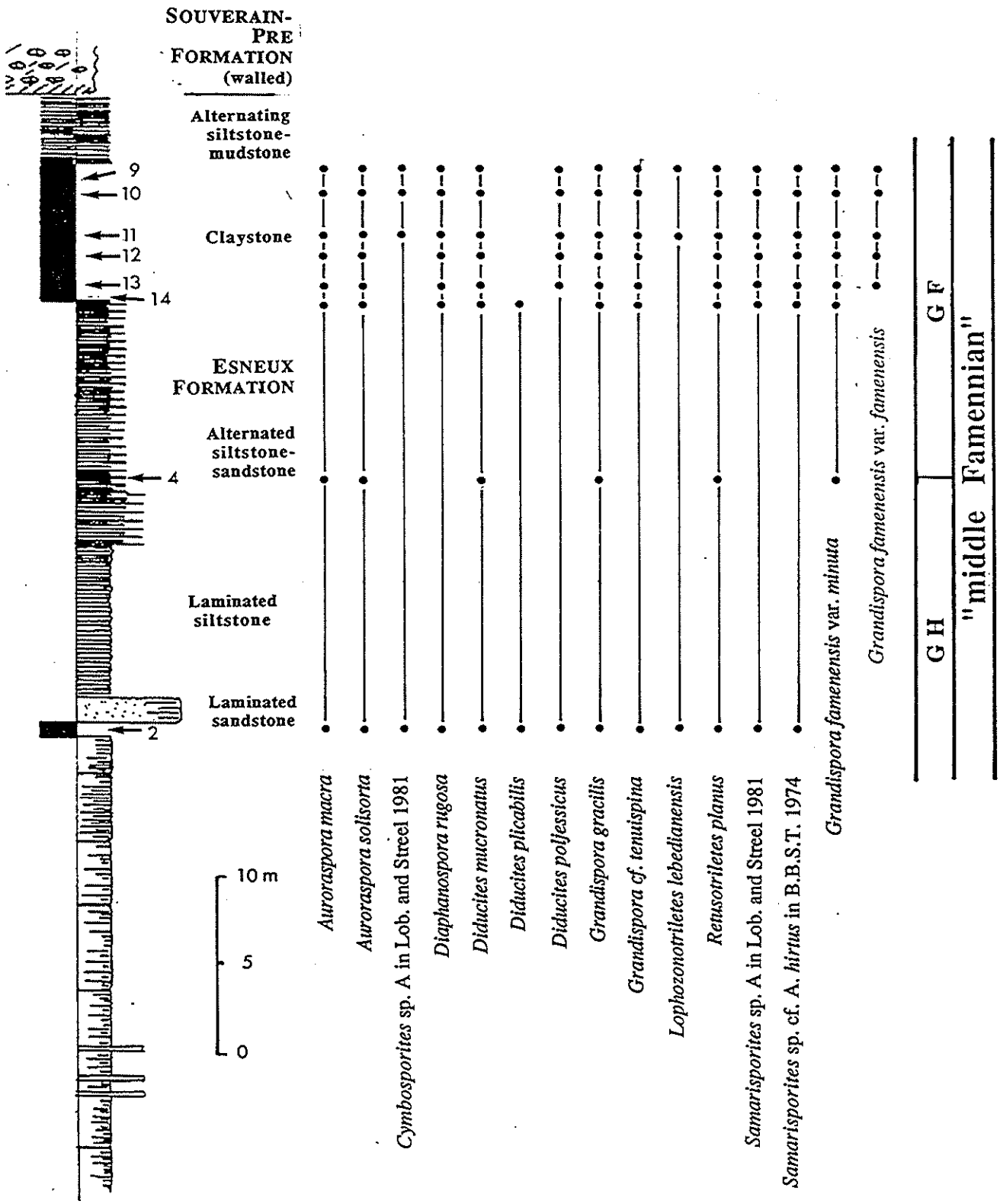

Figure 2. Section and miospore distribution in the Esneux and basal Souverain-Pré Formations at the locality of Esneux.

Photographs x 500, except where otherwise stated.
The miospore locations in the slides are based on England finder graticule coordinates.

PLATE 1

1,2. *Samarisporites* sp. cf. *Acanthotriletes hirtus* Naumova Streel *in* Becker *et al.*, 1974

1. Slide 11(1) : G56
2. Slide 10(1) : Z56

3. *Samarisporites* sp.
   Slide 12(2) : 051

4,5. *Samarisporites* sp. A *in* Loboziak & Streel 1981
   4. Slide 14(1) : H37
   5. Slide 11(1) : Q55/2

6. *Auroraspora macra* Sullivan 1968
   Slide 11(3) : M38/4

7. *Auroraspora solisorta* Hoffmeister, Staplin and Malloy 1955
   Slide 11(3) : G44

8. *Lophozonotriletes lebedianensis* Naumova 1953
   Slide 2(1) : R33/3

9,10. *Diaphanospora rugosa* (Naumova) Byvsheva 1985
   9. Slide 13(2) : Y36/2
   10. Slide 12(2) : S40

11. *Diducites versabilis* (Kedo) Van Veen 1981
   Slide 11(2) : E35

12. *Diducites mucronatus* (Kedo) Van Veen 1981
   Slide 2(2) : X22/2

13. *Diducites plicabilis* Van Veen 1981
   Slide 9(1) : T46

14. *Diducites poljessicus* (Kedo) Van Veen 1981
   Slide 9(1) : F38/2

15,16. *Retusotriletes planus* Dolby and Neves 1970
   15. Slide 10(2) : X50
   16. Slide 11(1) : O50/4

17-19. *Cymbosporites* sp. A *in* Loboziak and Streel 1981
   17. Slide 11(4) : Z48/2
   18. Slide 11(3) : W52/3
   19. Detail of the fig. 18 (x2000)

PL. I

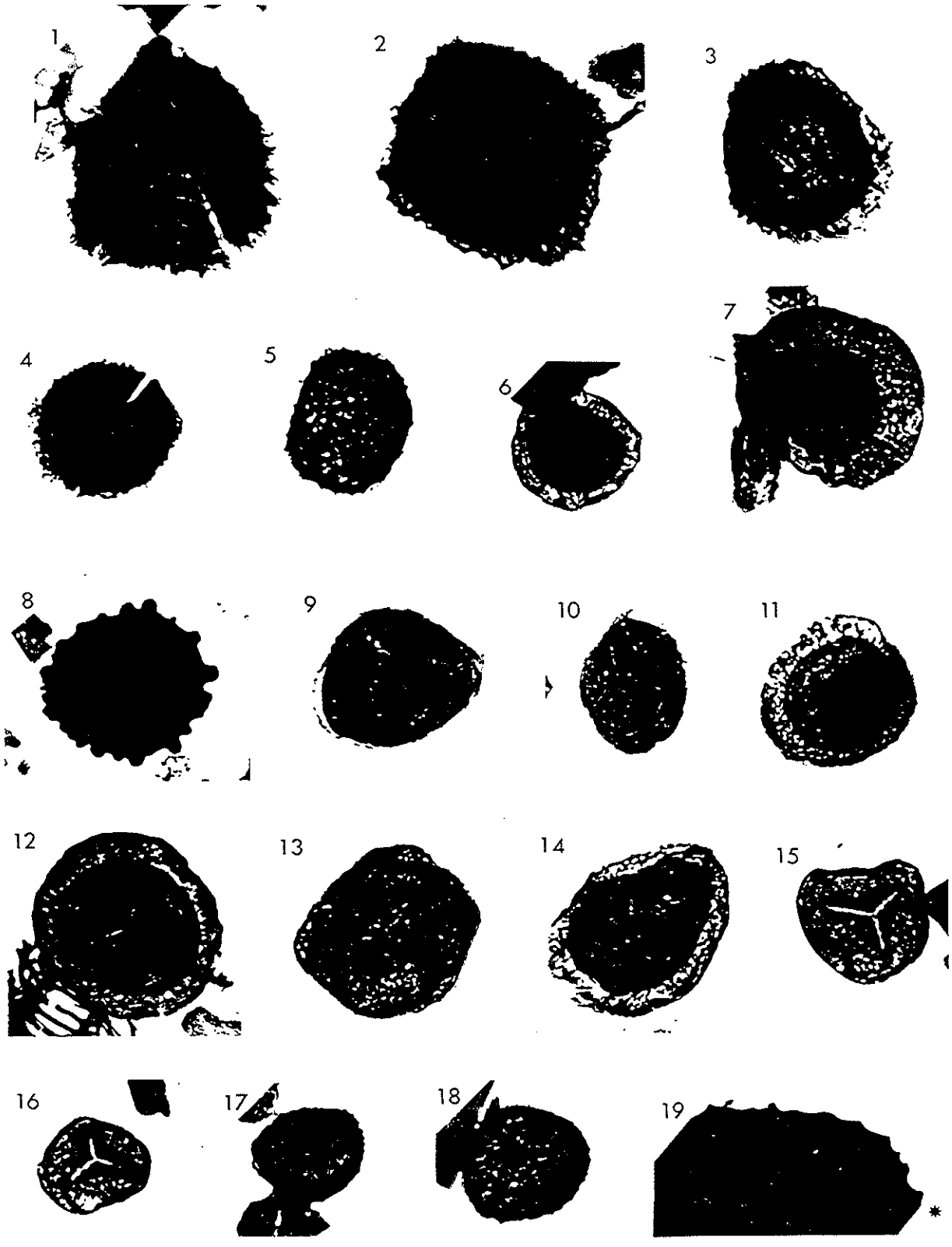

PLATE 2

1-4. *Grandispora gracilis* (Kedo) Streel *in* Becker *et al.* 1974
1. Slide 12(2) : L/55
2. Detail of the fig. 1 (x2000)
3. Slide 11(1) : E56
4. Detail of the fig. 3 (x2000)

5-9. *Grandispora* cf. *tenuispina* (Hacquebard) Playford 1971
5. Slide 13(1) : U35
6. Slide 12(2) : F40/4
7. Detail of the fig. 6 (x2000)
8. Slide 13/2 : G42
9. Detail of the fig. 8 (x2000)

10-14. *Grandispora famenensis* (Naumova) Streel *in* Becker *et al.* 1974 var. *minuta* Nekriata 1974
10. Slide 9(2) : W46/1
11,12. Detail of the fig. 10 (x2000)
13. Slide 11(4) : L46/3
14. Detail of the fig. 13 (x2000)

15-19. *Grandispora famenensis* (Naumova) Streel *in* Becker *et al.* 1974 var. *famenensis*
15. Slide 13(2) : J51
16. Slide 13(1) : N40
17. Detail of the fig. 16 (x2000)
18. Slide 13(1) : P41
19. Detail of the fig. 18 (x2000)

Pl. II

3. AGE OF THE MIOSPORE ASSEMBLAGE AND LATERAL CORRELATION

In the Pripyat Depression, in Byelorussia, the succession of first appearances of *G. famenensis* var. *minuta* and *G. famenensis* var. *famenensis* has also been demonstrated (Avkhimovitch *et al.* 1988). The former taxon occurs in the lowest subdivision (*famenensis-minutus* Subzone), the latter in the highest subdivision (*lupinovitchi* Subzone), of the *Cornispora varicornata* Assemblage-acme Zone. However, the duration of time separating these two subzones in Byelorussia is unfortunately yet unknown. In tems of correlation with the conodont biozones, the first occurrence of *G. famenensis* var. *minuta* is correlated there with the upper part of the *rhomboidea* conodont Zone. However, by definition, *Palmatolepis rhomboidea* is also present in the lowermost part of the *Palmatolepis marginifera* Zone, therefore, this correlation might be questionned because the conodont faunas in Byelorussia have not yet been revised and their correlation with the miospore assemblage explained. In a section of the Hoyoux valley studied recently (Bode, pers. comm., 1991) at Modave-Pont de Bonne, 25 km to the west of the Ourthe valley, the conodont early *marginifera* Zone is present in the upper part of the Esneux Formation. Therefore it might be that the upper part of the Esneux Formation in the type locality has the same age as the upper part of the Esneux Formation at Modave-Pont de Bonne. Alternatively, it might be that the upper limit of this formation is diachronous and that the upper part at Modave-Pont de Bonne has the same age as the lower part of the Souverain-Pré Formation at Esneux. Diachroneity of formations is well known in this area from the work of Thorez *et al.* (1977). It is therefore concluded that the base of the (GF) *gracilis-famenensis* Zone should probably be correlated with the late *rhomboidea* Zone or with the early *marginifera* Zone, rather than with the late *marginifera* Zone as formerly proposed by Bouckaert *et al.*, 1971 and Becker *et al.* 1974. In conclusion it appears that the first occurrence of *G. famenensis* seems to be a good marker even for long distance correlation in Europe.

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