

NEW INSIGHT ON THE “CUL D’HOUILLE” SECTION (GIVETIAN, MIDDLE DEVONIAN) NEAR FLOHIMONT (ARDENNES, FRANCE)

Nouvelles données sur la coupe du “Cul d’Houille” (Givétien, Dévonien moyen) près de Flohimont (Ardenne, France)

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Abstract. — The Cul d’Houille section outcrop, located on the southern border of the Dinant synclinorium (French Ardennes), partly exposes a carbonate series from the middle to upper Givetian (Middle Devonian). This study presents 1- the complementary description of some new recently washed beds, belonging to the lower member (Flohimont Mb.) of the Fromelennes Formation, and 2- the precise location of the member and formation boundaries allowing correlation with the Givetian type sections in southern Ardenne.

Résumé. — L’affleurement de la coupe du Cul d’Houille, appartenant à la bordure sud du synclinorium de Dinant (Ardenne françaises) permet l’observation partielle d’une série carbonatée d’âge givétien moyen à supérieur (Dévonien moyen). Cette étude consiste 1- en une description complémentaire de nouveaux bancs, mis en évidence récemment par décapage, appartenant au membre de base (Membre de Flohimont) de la Formation de Fromelennes, et 2- au positionnement des limites précises des membres et formations pour ce site, permettant des corrélations avec les coupes types du Givétien en Ardenne méridionale.

Keywords : Dinant synclinorium, Fromelennes, boundaries, stratigraphy

Mots-clés : Synclinorium de Dinant, Fromelennes, limites, stratigraphie

I. — INTRODUCTION

The « Cul d’Houille » section, located near Flohimont (Champagne-Ardenne, France), belongs to the southern border of the Dinant synclinorium. The section, 236 metres-thick, has been described bed by bed by Hubert & Pinte (2009). It exposes the Givetian series of the Mont d’Hairs to Fromelennes formations, similarly to the Fromelennes-Flohimont section, situated on the north-eastern bank of the Houille river.

The boundary between the Mont d’Hairs and Fromelennes formations (Hubert & Pinte, 2009) has not been precisely located due to the discontinuity of the section (vegetation invaders). In this work, we described four new meters of the section (about 15 beds) and discussed the historical boundaries of formations and members. The material sampled for analyses is housed in the collections of the Faculté Libre des Sciences et Technologies (FLST), Lille.

II. — RESULTS

The type-locality of the Givetian (Gosselet, 1879) is composed by numerous sections. The most studied are, 1- the escarpment of the Charlemont fortress along the Meuse river which corresponds to the Givetian stratotype, 2- the Mont d’Hairs and Moulin Boreux sections described by Bonte & Ricour (1949) and Pel (1974) as stratotypical sections, 3- the Fromelennes-Flohimont section (Bultynck, 1974; Cornet, 1975; Bultynck *et al.*, 2001) which exposes all the Givetian’s formations and 4- the Cul d’Houille section, less studied (Cornet, 1975; Prétat & Carliez, 1996), which now probably provides the best section of middle-upper Givetian.

1) Lithology

The new beds (102”A to 111”E, Fig. 1-2) belong to the first member (Flohimont Member) of the Fromelennes Formation. These last are composed of slightly argillaceous

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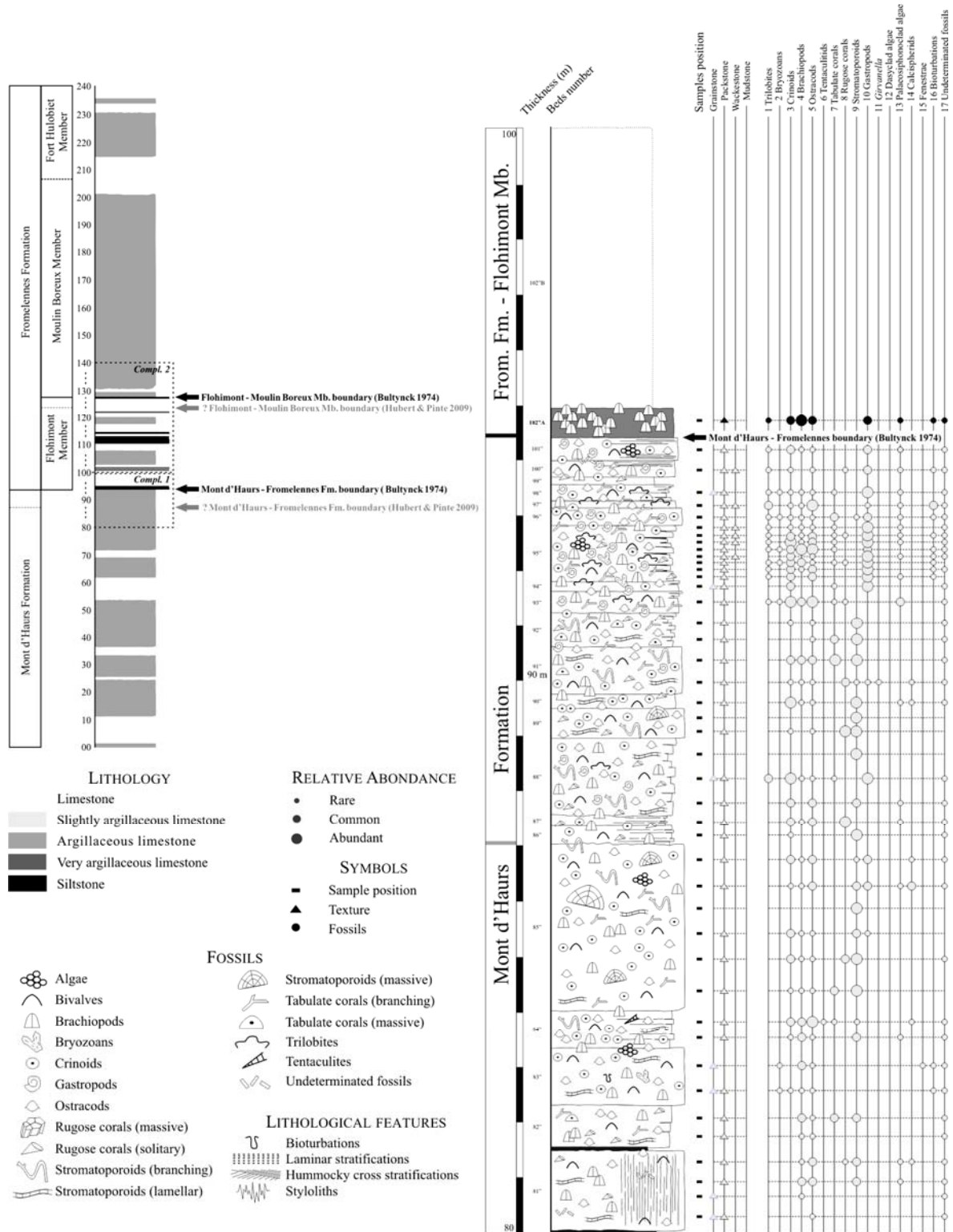


Fig. 1. — Synthetic succession of the “Cul d’Houille” section (left) with location of the detailed succession described in this paper (right). Detailed lithology of the succession from 80 to 100 m (Mont d’Haus Formation and Flohimont Member of the Fromelenes Formation) – comprising the Mont d’Haus and Fromelenes formations boundary (bed 102”A), grey bars correspond to the boundaries sensu Hubert & Pinte 2009, black bars and arrows correspond to the Bulync’s (1974) boundaries.

Fig. 1. — Colonne lithologique synthétique de la coupe du “Cul d’Houille” (à gauche) avec localisation des logs détaillés dans cette note (à droite). Lithologie détaillée de la coupe entre les côtes 80 et 100 m depuis la base du levé (comprenant la Formation du Mont d’Haus et le Membre de Flohimont de la Formation de Fromelenes) - exposant la limite entre les deux formations citées auparavant (bancs 102”A), les barres grisées correspondent aux limites définies par Hubert & Pinte, 2009, les barres noires correspondent à celles de Bulync (1974).

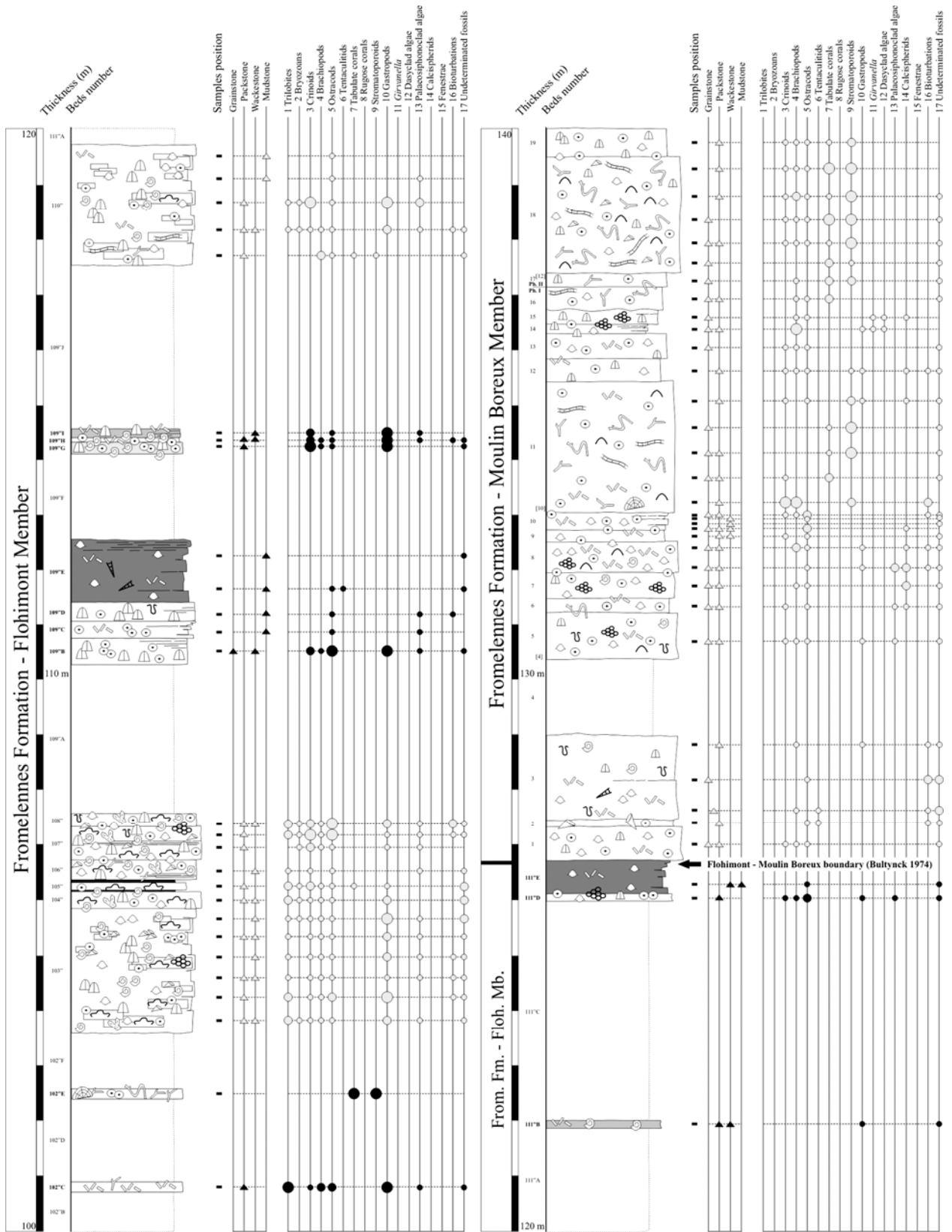


Fig. 2. — Detailed lithology of the succession from 100 to 140 m (Fromelennes Formation, Flohimont and Moulin Boreux members) – comprising the Flohimont and Moulin Boreux members boundary (bed 111’).

Fig. 2. — Lithologie détaillée de la coupe entre les côtes 100 et 140 m depuis la base du levé (comprenant les membres de Flohimont et du Moulin Boreux de la Formation de Fromelennes) - exposant la limite entre les deux membres cités auparavant.

and argillaceous grey-dark limestone, decimetre to metre-thick, sometimes rich in bioclasts. The textures vary from wackestone to packstone with rare grainstone lenses. Some new beds are typical: the bed 102"A corresponds to brachiopod coquina with ostracodes and crinoids. The bed 102"E is particularly rich in reefal bioclasts – lamellar stromatoporoids and tabulate corals association. The beds 109"G to H are very rich in gastropods.

2) Fromelennes Formation boundaries: previous works

The boundary between the Mont d'Hours and Fromelennes formations (Flohimont Member) in the outcrops located along the road D46 and in the Cul d'Houille quarry at Flohimont was originally defined by Bultynck (1974) and Cornet (1975). According to these authors and to Bultynck *et al.* (1991, 2001) and Lacquement *et al.* (2006), the base of Fromelennes Formation is marked by the first clayey limestone bed containing a rich fauna of brachiopods.

About the boundary between the Flohimont and Moulin Boreux members only visible in the Cul d'Houille quarry, Bultynck (1974) defined the first beds belonging to the Moulin Boreux Member as a huge dolomitic and massive 3.9 metres-thick limestone, overlaying a unity of thin dolomitic argillaceous beds belonging to the Flohimont Member.

3) Fromelennes Formation boundaries: "Cul d'Houille" section

The complete "Cul d'Houille" section was described for the first time by Hubert & Pinte (2009). Because of vegetation invasion the authors defined the boundaries of the members of Fromelennes Formation either on sedimentological criteria or indicated the incertitude of their boundaries. The discovery of some new beds allows correlating the boundaries defined in this section with previous works (i. e. Bultynck, 1974).

Mont d'Hours / Fromelennes (Flohimont Member) formations

The bed 102"A (fig. 1) constitutes the first bed of the Fromelennes Formation (*sensu* Bultynck, 1974). This argillaceous limestone bed, presenting brachiopod coquina and well diversified microfauna, surmounts an alternation of reef-limestone and argillaceous limestone belonging to the upper part of the Mont d'Hours Formation. This boundary has never been observed in the Cul d'Houille section previously, that is why Hubert & Pinte (2009) placed this boundary lower in the series, at the base of the first argillaceous limestone (bed 86") overlaying a huge biostromal unit.

Flohimont / Moulin Boreux members (Fromelennes Formation)

The boundary between the first member (Flohimont Member) and the second one (Moulin Boreux Member) of the Fromelennes Formation is also located, between beds number 111"E and number 1 (fig. 2). The lithology is characterized by a transition from thin grey argillaceous beds presenting some microfossils (mainly ostracodes) to grey-dark dolomitic

limestone beds, 2.4 metres-thick, containing small reworked bioclasts (mainly brachiopods and gastropods). The transition from argillaceous to dolomitic limestone beds has not clearly been observed by Hubert & Pinte (2009), but clearly corresponds to this described by Bultynck (1974).

Although the Flohimont Member is yet partially visible, this one consequently reaches a thickness of about 31 metres, in accordance with the works of Bultynck (1974) and Bultynck *et al.* (2001).

III. — DISCUSSION

According to Bultynck's (1974) work, the boundary between the Mont d'Hours and Fromelennes formations is the first argillaceous limestone presenting brachiopods coquina (bed 102"A). According to Hubert & Pinte (2009), this boundary was the first slightly argillaceous limestone (bed 86") overlaying the last huge biostromal unit (bed 85"). The new beds put forwards have permitted to locate the boundary between the two formations.

However, this boundary will be different in other part of the sedimentary area, and do not correspond to a slightly argillaceous limestone presenting brachiopods coquina. Consequently what are the best criteria to standardize the boundaries of formations in a geographic area?

The beds 89" to 91" are yet massive limestone containing a small builder fauna. From the bed 92" to 102"A the series is composed by argillaceous limestone. The bed 93" is marked by a renewal of the fauna from tabulates and stromatoporoids to trilobites-ostracodes-brachiopods and gastropods assemblages.

Thus, the change of microfauna due to a transgressive episode (Bultynck *et al.*, 2001) is clearly marked and located in the bed 93". It should be interesting to use the bed characterized by the beginning of this event for the global correlations in the southern border of the Dinant synclinorium.

IV. — CONCLUSIONS

Despite the numerous lacks in the Cul d'Houille section, these new beds and the location of some historical boundaries complete the Givetian section's database (Hubert, 2008a-b ; Hubert & Mabille, 2009 ; Hubert & Pinte, 2009) for the southern border of the Dinant synclinorium. This work will allow precisising correlations of this section with other places exposing the Givetian.

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