

rhenanus/varcus Zones (= Lower *varcus* Zone) (Bultynck et al., 2000).

Remarks: See Rivière Formation.

2.2.14. Le Roux Formation - ROU

Authors: de Dorlodot, 1893; Lacroix, 1974; Coen-Aubert, 1991c.

Description: The lower part consists of alternating shales and argillaceous sandstones; the middle part is composed of sandy limestone overlaid by micritic dolomites; the upper part consists of dark micritic limestones with a few intercalations of shales and micritic dolomites.

Stratotype: Fosses-la-Ville (Aisemont), road cut at the southern corner of the Moreau quarry.

Area: Northern flank of the Dinant Synclinorium; southern flank of the Namur Syncline between Presles and the Meuse and Vesdre Nappe.

Thickness: About 30 m in the stratotype section on the southern flank of the Namur Syncline, where the thickness decreases to the east and the formation disappears east of the Meuse. On the northern flank of the Dinant Synclinorium the thickness varies between 22 and about 40m, in the Vesdre Nappe between 16 and 85 m.

Age: Middle to late Givetian; the Roux Fm is a northern lateral equivalent of the Fromelennes Formation (Coen-Aubert, 1991).

2.2.15. Bois de Bordeaux Formation - BOR

Authors: Légende carte géologique 1/40.000, 1929; Lacroix, 1991b.

Description: Lacroix (1991) subdivided the Bois de Bordeaux Fm into three members, in ascending order Mautiennes, Alvaux and Mazy Members.

The contact between the conglomeratic base of the Mautiennes Mbr and the underlying Silurian rocks represents an angular unconformity. The member is composed essentially of red, greenish or variegated sandy-argillaceous rocks. The main part of the Alvaux Mbr consists of organoclastic limestones with thin interbedded shale layers and intercalations of oolitic limestones. The macrofauna includes colonial rugose corals, brachiopods and a biostromal level with stromatoporoids near the top. The Mazy Member essentially consists of red sandy-silty shales with a few intercalations of reddish and greyish limestone beds.

Stratotype: Gembloux, between Mazy and Les Mautiennes on the east banks of the Orneau river.

Area: Northern flank of the Namur Syncline between Soignies and Lavoir.

Thickness: About 120 m in the Orneau Valley in the central part of the northern flank of the Namur Syncline, only 10 m at Soignies in the western part and about 20 m at Lavoir in the eastern part.

Age: Givetian; conodont data from the Mautiennes and Alvaux Members support correlation with the upper part of the Terres d'Haura Fm, the Mont d'Haura Fm and the lower part of the Fromelennes Fm on the southern flank of the Dinant Synclinorium. The base of the overlying Bovesse Fm belongs to the Lower *falsiovalis* Zone (Lacroix, 1999).

2.2.16. Vicht Formation - VIC

Authors: Holzapfel, 1910; Dejonghe, Hance & Steemans, 1991a.

Descriptions: Alternating thick bedded reddish conglomerates, sandstones and siltstones with rare shaly intercalations.

Stratotype: Vicht Valley at Vicht near Stolberg (Germany).

Hypostratotype: Eupen, bottom of the Helle river.

Area: Vesdre Nappe.

Thickness: about 80 m at Vicht, about 20 m at Eupen and 6 m at Fraipont.

Age: Eifelian; spores from a level near the middle part of the formation in Eupen are assigned to the AD assemblage Zone (Hance et al., 1992).

2.2.17. Pépinster Formation - PER

Authors: Dejonghe, Hance & Steemans, 1991b.

Description: The formation essentially consists of greenish, reddish and variegated shales, siltstones and sandstones. The rocks become calcareous in the upper part. A characteristic unit with greenish sandstones and two conglomerate beds and containing plant fragments, brachiopods and tentaculites occurs about 10 m above the base of the formation; it corresponds to the Heusy Member of Hance et al., 1989.

Stratotype: composite stratotype based on three sections at Pépinster: west banks of the Hogne, railway section Pépinster Spa and railway section Liège-Eupen, km 121.

Area: South-eastern flank of the Dinant Synclinorium, north of the Xhoris Fault and Vesdre Nappe.

Thickness: 213 m at Remouchamps (south-eastern flank of the Dinant Synclinorium); in the Vesdre Nappe the thickness of the formation increases from west to east, 53 m at Prayon and 95 m at Pépinster.

Age: Late Eifelian-early Givetian based on spores (Steeemans, 1991).

3. Frasnian lithostratigraphic units

3.1. Introduction

The "Système du Calcaire de Frasne" was introduced by d'Omalus d'Halloy (1868) and the name "Frasnien" was used for the first time by Gosselet (1879) corresponding to the base of the "Calcaire et schistes de Frasne" and to the

lower part of the Upper Devonian (Gosselet, 1880). At a meeting of the Subcommittee on Devonian Stratigraphy (SDS) at Binghamton, N.Y. in 1981 the name Frasnian was formally retained for the lower stage of the Upper Devonian. The base of the Frasnian has been defined in the Global Stratotype Section and Point at the Col du Puech de la Suque in the Montagne Noire (France) on the basis of the earliest occurrence of the conodont species *Ancyrodella rotundiloba* (Klapper et al, 1987). This boundary almost coincides with the original boundary and it is accurately documented in a section at Nismes, near Frasnès, 1.5 m above the base of the Nismes Fm and the base of the Frasnès Group (Bultynck et al, 1988). This section was adopted by the SDS (Prague 1986) as an auxiliary boundary stratotype for neritic facies.

Frasnian rocks of the Ardenne are exposed in the Dinant and Namur Synclinoria and in the Vesdre Nappe. However, five more specific areas can be recognized on the basis of differences in the lithostratigraphic subdivisions: the southern flank of the Dinant Synclinorium; the Philippeville Anticlinorium; the northern flank of the Dinant Synclinorium, the southern flank of the Namur Synclinorium and the Vesdre Nappe; the eastern part of the northern flank of the Namur Synclinorium and the central part of the last mentioned area.

The names of some of the lithostratigraphic units used herein were already introduced in the 19th Century, e.g. "Schistes de Matagne, Schistes de Barvaux, Assise de Bovesse, Assise de Rhisnes...". The first detailed stratigraphic subdivision of the Frasnian, based on both lithological and paleontological criteria, was published by Maillieux & Demanet (1929), e.g. F2a, F2b, ... These subdivisions have been widely used until the early seventies of the past century. From this period on, following the recommendations of the first edition of the International Stratigraphic Guide, formal lithostratigraphic units have been introduced. Tsien (1974) proposed a lithostratigraphic scheme for the Frasnian of the Ardenne, however showing still the deficiencies of a first attempt. A complete set of Frasnian lithostratigraphic units covering the Ardenne area and resulting from meetings of the Belgian Subcommittee on Devonian Stratigraphy was published by Boulvain et al (1999). The present synthesis is based on the latter publication.

A generalized lithostratigraphic cross-section of Upper Givetian to Lower Famennian formations across the southern and northern border of the Dinant Synclinorium is given in figure 6.

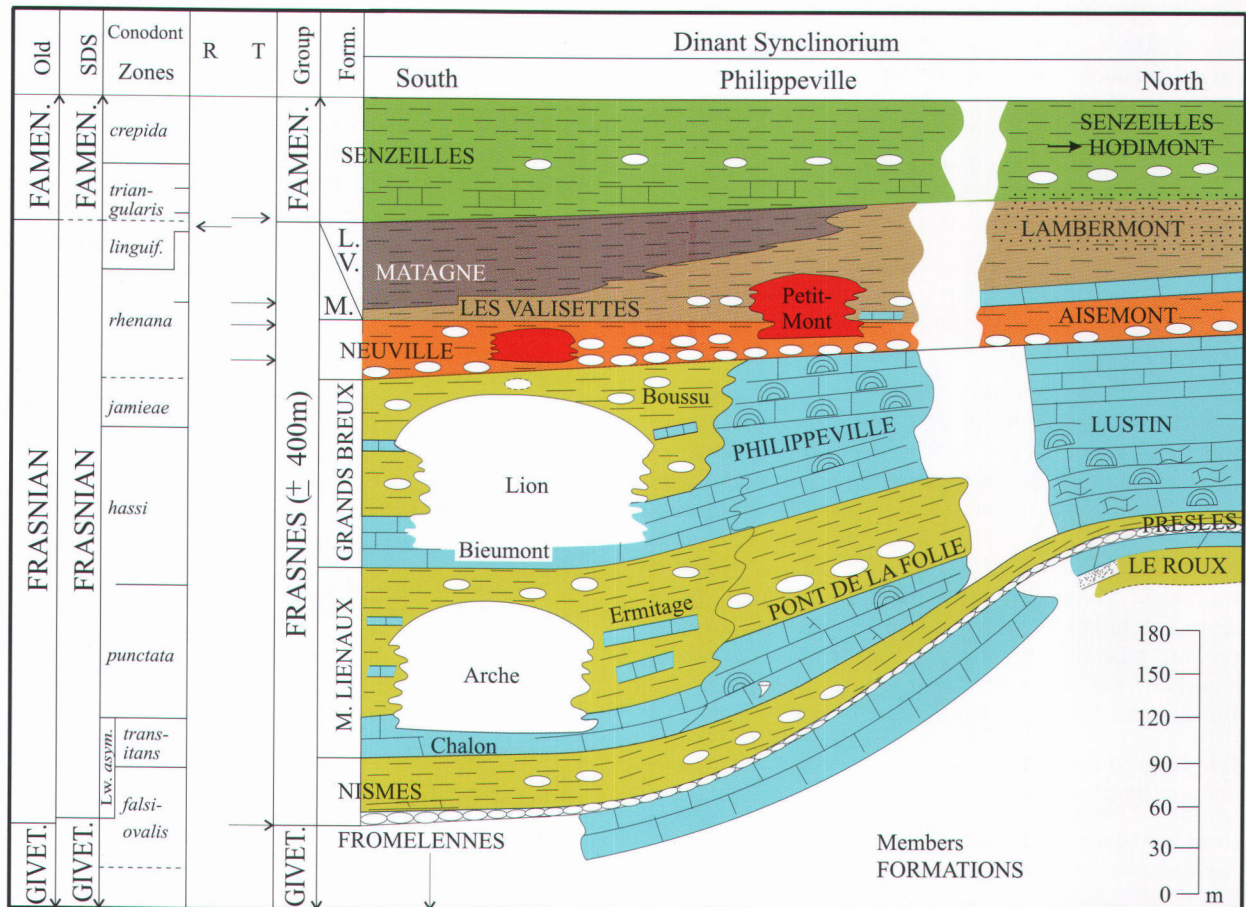


Figure 6. Generalized lithostratigraphic cross-section of Upper Givetian to Lower Famennian formations across the southern and northern border of the Dinant Synclinorium.

3.2. Descriptions

3.2.1. Nismes Formation - NIS

Authors: Bultynck, Casier, Coen, Coen-Aubert, Godefroid, Jacobs, Loboziak, Sartenaer & Streef, 1988; Bultynck & Coen, 1999.

Description: The Nismes Fm is an essentially greenish shaly unit with subordinate nodules, subnodular or nodular limestone beds and some limestone lenses mainly developed in the lower and middle members (Pont d'Avignon and Sourd d'Ave). The top of the shaly upper member (La Prée) is either below a marked bedded limestone bar or a sequence with interbedded shales and limestones. The two lower members contain rich atrypid and spiriferid brachiopod faunas.

Stratotype: Nismes, outcrops on the northern border of the Bois du Mousti.

Area: Southern, central and eastern part of the Dinant Synclinorium; some parts of the northern flank of the Dinant Synclinorium and the Vesdre Nappe.

Thickness: Between 39 and 20 m in the three former areas, between 10 and 5 m in the two latter areas.

Age: Apart the Pont d'Avignon Mbr in the central part of the southern flank of the Dinant Synclinorium, the Nismes Fm is of early Frasnian age (Lower *falsiovalis* to lower part of *transitans* conodont Zones) based on the first occurrence of the conodont *Ancyrodella rotundiloba* (see Bultynck et al., 1988). The formation corresponds to a major Devonian transgressive phase and its base becomes younger from the south to the north-east and the north.

3.2.2. Moulin Liènaux Formation - MLX

Authors: Tsien, 1974; Chalon, Arche and Ermitage Members; Bultynck & Mouravieff, 1999.

Description: In its type locality the Moulin Liènaux Fm is divided in ascending stratigraphic order into the Chalon, Arche and Ermitage Members. The lower part of the Chalon Mbr consists of interbedded grey-brownish shales and thin argillaceous nodular limestone beds, in the upper part thickness and frequency of limestone beds increase; the macrofauna consists of corals and brachiopods. The Arche Mbr is represented by large bioherms (up to 120 m thick) with stromatolites, corals and stromatoporoids. In the lower part the limestone is pinkish-reddish, in the upper part light-grey. Development of the bioherms starts in the upper part of the Chalon Mbr and continues in the major part of the Ermitage Mbr. The latter consists essentially of greenish shales with at some levels argillaceous nodular limestone beds.

Stratotype: Abandoned Arche Quarry immediately south of Frasnies; the boundary with the overlying Grands Breux Fm is exposed in the nearby railway cut Couvin-Charleroi.

Area: Southern part of the Dinant Synclinorium and south-eastern border of this synclinorium up to Durbuy

(Chalon Mbr) and Aywaille (Ermitage Mbr). The Arche Mbr bioherms are known from the western part of the southern border of the Dinant Synclinorium and from the southern part of the Philippeville Anticlinorium.

Thickness: About 150 m in the type area. The formation is thinning out and away on the south-eastern border of the Dinant Synclinorium.

Age: Early and middle Frasnian, upper part of *transitans* conodont Zone, *punctata* Zone and lower part of *hassi* sl Zone (Vandelaer et al., 1989).

3.2.3. Grands Breux Formation - GBR

Authors: Tsien, 1974; Bieumont, Lion and Boussu-en-Fagne Members; Coen-Aubert & Boulvain, 1999.

Description: In its type locality the Grands Breux Fm is divided in ascending stratigraphic order into the Bieumont Mbr and the Boussu-en-Fagne Mbr. Large bioherms are developed in the uppermost part of the former member and the main part of the latter member. The Bieumont Mbr consists of greyish micritic, sometimes bioclastic, well bedded to nodular limestones with shaly intercalation in its upper part. The Boussu-en-Fagne Mbr essentially consists of greenish shales with calcareous nodules, alternating at some levels with nodular or bedded limestones. The Lion Mbr bioherms are made up mainly of greyish massive, micritic limestones with local development of stromatolites, stromatoporoids and tabulate corals. Talus-like structures of bedded argillaceous and bioclastic limestones indent the flanks of the bioherm in its upper part.

Stratotype: Railway cut Couvin-Charleroi south of Frasnies (Bieumont and Boussu-en-Fagne Mbrs); the Lion Mbr is exposed in the nearby Lion Quarry.

Area: The Bieumont and Boussu-en-Fagne Mbrs occur along the southern and south-eastern borders of the Dinant Synclinorium up to Barvaux. Bioherms representing the Lion Mbr are well developed in the western part of southern border of the Dinant Synclinorium, between Dourbes and Trélon (NE France).

Isolated occurrences are known from Rochefort and the south-western part of the Philippeville Anticlinorium.

Thickness: About 120 m for the Bieumont and Boussu-en-Fagne Mbrs together in the type area; thickness of the Lion Mbr bioherms is estimated at 120 m - 250 m. The formation is gradually thinning to the east and farther to the north-east.

Age: Middle Frasnian, containing conodonts of the *hassi* sl, *jamieae* and lower part of the Lower *rhenana* Zones (Mouravieff, 1982; Coen-Aubert & Boulvain, 1999).

3.2.4. Neuville Formation - NEU

Authors: Tsien, 1974; lower part; Boulvain, Coen & Coen-Aubert, 1993, 1999a.

Description: Typically dense nodular shales, with only few inferior nodular and argillaceous limestone beds.

The macrofauna mainly consists of colonial corals. Reddish-pinkish, massive limestone mounds with typical stromatolites, colonial corals and brachiopods (Petit-Mont Member) occur in the Neuville Fm and the overlying Valisettes Fm.

Stratotype: Southern Neuville railway cut and abandoned Petit-Mont Quarry at Vodelée, type locality of the Petit-Mont Mbr.

Area: Southern and South-eastern border of the Dinant Synclinorium up to Sy and in the Philippeville Anticlinorium.

Thickness: On the southern and south-eastern border of the Dinant Synclinorium the thickness varies between about 25 m in the Frasnes-Nismes area, 40 m at Givet, 110 m at Han-sur-Lesse and 50 m at Sy. In the Philippeville Anticlinorium thickness is about 15 m tot 25 m. The thickness of the Petit-Mont mounds is from about 20 m tot 80 m.

Age: Late Frasnian, Lower *rhenana* conodont Zone (Coen & Coen-Aubert, 1976; Bultynck et al., 1998).

3.2.5. Valisettes Formation - VAL

Authors: Murlon & Bayet, 1902: Fr2; Boulvain, Coen & Coen-Aubert, 1993, 1999b.

Description: Fine dark-grey, greenish and violet shales with a few thin limestone beds at the base. The shales become nodular in the vicinity of locally developing reddish-pinkish limestone mounds belonging to the Petit-Mont Mbr (see Neuville Fm).

Stratotype: Southern Neuville railway cut.

Area: Typically developed in the Philippeville Massif; it also occurs locally, with reduced thickness, on the southern border (Nismes) and the south-eastern border (Barvaux area) of the Dinant Synclinorium.

Thickness: At least 90 m in the type area.

Age: Late Frasnian, the Upper *rhenana* conodont Zone starts close to the base of the formation (Coen & Coen-Aubert, 1976; Bultynck et al., 1998).

3.2.6. Matagne Formation - MAT

Authors: Gosselet, 1871; Coen, Casier, Helsen & Mouravieff, 1999.

Description: Fine dark greenish-brown to black shales with generally a few dark limestone beds in the lowermost part. The macrofauna consists of the small bivalve *Buchiola*, brachiopods and goniatites.

Stratotype: Railway section Mariembourg-Nismes, immediately south-west of the "Tienne aux Pauquet".

Area: Southern border of the Dinant Synclinorium and Philippeville Anticlinorium.

Thickness: At least 50 m on the southern border of the Dinant Synclinorium and about 10 m in the Philippeville Anticlinorium.

Age: Late Frasnian; on the southern border of the Dinant Synclinorium the lower part of the Matagne Fm belongs to the Upper *rhenana* conodont Zone; in the Philippeville Anticlinorium the formation is within the *linguiformis* Zone (Bultynck et al., 1998).

3.2.7. Barvaux Formation - BAR

Authors: Gosselet, 1880b; Coen, 1999.

Description: Violet shales, slightly nodular in the lower and upper part; some levels are characterized by large cyrtospiriferids and coquinoïd and sandy layers. Reddish mudmounds occur locally in the lower part.

Stratotype: Railway section south of Barvaux, west of Biron.

Area: Mainly south-eastern border of the Dinant Synclinorium up to the Sy-Hamoir area and also in the most eastern part of the southern border of the Dinant Synclinorium (Houyet).

Thickness: About 90 m in the type area.

Age: Late Frasnian to early Famennian; Upper *rhenana* to Lower *triangularis* conodont Zones (Coen, 1999).

3.2.8. Pont de la Folle Formation - FOL

Authors: Boulvain, Coen & Coen-Aubert, 1993, 1999c.

Description: The lower part corresponding to the La Fontaine Samart Mbr, consists of a biostromal unit with stromatolites, stromatoporoids and tabulate corals overlain by dark bedded limestones. The overlying Machenées Mbr consists of nodular shales and nodular limestones in the lower and middle parts and of shale in its upper part. In some area the lower member is affected by dolomitisation.

Stratotype: Road section Charleroi-Couvin, immediately south of Philippeville.

Area: Mainly Philippeville Anticlinorium.

Thickness: 90 m in the type area.

Age: Early to middle Frasnian; from upper part of *transitans* into lower part of *hassi* sl conodont Zones (Coen, 1977).

3.2.9. Philippeville Formation - PHV

Authors: Boulvain, Coen & Coen-Aubert, 1993, 1999d.

Description: The lower part comprises dark thin-bedded limestones with some reef lentils; the upper part consists of a thick-bedded biostromal unit with stromatoporoids and massive colonial rugose corals near the top. In some localities the limestones are affected by dolomitisation.

Stratotypes: Road section Charleroi-Couvin, immediately south of Philippeville, north of Km-stone 79; the biostromal unit is better exposed in the northern Neuville railway section, south-west of Neuville.

Area: Philippeville Anticlinorium, Avesnois area (north-eastern France), and south-eastern border of the Dinant Synclinorium between Netinne and Sy.

Age: Middle Frasnian; probably from the lower part of the *hassi* conodont Zone into the lower part of the Lower *rhenana* Zone (Coen, 1977; Gouwy & Bultynck, 2000).

3.2.10. Presles Formation - PRE

Authors: Coen-Aubert, Dejonghe, Cnudde & Tourneur, 1985; Coen-Aubert, 1999a.

Description: In the lower part argillaceous and bioclastic limestones containing a few horizons with haematitic oolites, overlaid by fine greenish shales. In some areas the limestones are dolomitic.

Stratotype: Section along the Namur-Charleroi road, immediately south of Presles.

Area: Northern border of the Dinant Synclinorium from Lustin to Tilff, southern border of the Namur Synclinorium and the Vesdre Nappe.

Thickness: About 10 m in the type area, in other areas between 1 and 16 m.

Age: Lower Frasnian; from the top of Upper *falsiovalis* to the lower part of the *transitans* conodont Zones (Coen-Aubert, 1999).

3.2.11. Lustin Formation - LUS

Authors: Coen-Aubert & Coen, 1975; Coen-Aubert, 1999b.

Description: The lower part consists chiefly of a massif biostrome with branched stromatoporoids and corals with a few beds of crinoidal and dolomitic limestone below its base and overlaid by argillaceous limestone with branched colonial corals; the middle part consists of biostromal limestone mainly with tabular stromatoporoids; the upper part consists of well bedded micritic limestone with massif stromatoporoids in the uppermost part.

Stratotype: Frênes Cliffs at Lustin; the formation is also well exposed in the nearby Tailfer Quarry.

Area: Northern part of the Dinant Synclinorium, southern part of the Namur Synclinorium, south-eastern border of the Dinant Synclinorium between Remouchamps and Aywaille and Vesdre Nappe.

Thickness: A little more than 100 m in the type area.

Age: Middle Frasnian; the lower part of the Lustin Formation most likely belongs to the *punctata* conodont Zone and the upper part to the Lower *rhenana* Zone (Coen-Aubert & Coen, 1975; Gouwy & Bultynck, 2000).

3.2.12. Aisemont Formation - AIS

Authors: Graulich, 1961; Lacroix, 1974, 1999a.

Description: The lower part consists of bedded argillaceous limestones with massif colonial rugose corals; the middle part is made up by nodular shales and shales; the upper part consists of dolostones or locally of limestones with algae, massif colonial rugose corals, stromatoporoids, tabulate corals and bryozoans.

Area: Southern border of the Namur Synclinorium, eastern part of the northern border of the same synclinorium, northern border of the Dinant Synclinorium, Remouchamps area and in the Vesdre Nappe.

Thickness: about 22 m in the type area.

Age: Late Frasnian, within the Lower and lowest part of the Upper *rhenana* conodont Zones (Coen-Aubert & Lacroix, 1979 and 1985).

3.2.13. Lambermont Formation - LAM

Authors: Laloux & Ghysel, 1999.

Description: Chiefly a shaly unit with a few nodules and rare thin limestone and silty beds. Most of the middle part is characterized by nodular shales with a biostromal bed with massif colonial rugose corals at its base. Brachiopod coquinas occur in the uppermost part. The shales are mostly greenish, greyish or violet at some levels. The upper boundary corresponds to the oolitic haematite bed at the base of the overlying Hodimont Formation.

Stratotype: Western access road to the highway Verviers-Prüm at Lambermont.

Area: Northern border of the Dinant Synclinorium, Remouchamps area, Vesdre Nappe and southern border of the Namur Synclinorium.

Thickness: 50 m to 100 m in the Vesdre Nappe.

Age: Upper Frasnian-lower Famennian, from the Upper *rhenana* into the *triangularis* conodont Zones (Coen-Aubert, 1974; Dreesen, 1982).

3.2.14. Bovesse Formation - BOV

Authors: Stainier, 1903; Lacroix, 1999b.

Description: Thin conglomeratic and sandy-silty unit at the base; the middle part consists of micritic limestones alternating with dolostones; the upper part is shaly with a few argillaceous limestone beds.

Stratotype: Mehaigne Valley east of Huccorgne.

Area: Northern border of the Namur Synclinorium.

Thickness: about 80 m in the type area.

Age: Lower Frasnian, from *falsiovalis* into *punctata* conodont Zones (Coen-Aubert et al., 1981; Gouwy & Bultynck, 2000).

3.2.15. Rhisnes Formation - RHI

Authors: Malaise, 1902; Lacroix, 1999c.

Description: Consists mainly of a nodular brachiopod limestone, dolomitized at some levels. In some localities the middle part either consists of bedded bioclastic limestones overlaid by coral and stromatoporoid beds or of black micritic limestones.

Type areas: Sennette Valley north of Ecaussinnes and Samme Valley north-east of Feluy. Because of the discontinuous nature of the exposures a formal stratotype cannot be designated.

Area: Central and western part of the northern border of the Namur Synclinorium.

Thickness: About 60 to 90 m.

Age: Middle Frasnian, laterally equivalent to the Huccorgne Fm (Lacroix, 1999).

3.2.16. Huccorgne Formation - HUC

Authors: Coen-Aubert & Lacroix, 1985, 1999d.

Description: The lower part, Biénonart Member, consists of dark bioclastic bedded coral limestones; the overlying Robiewez Mbr is a thin bedded light-grey micritic limestone, often dolomitic; the Mehaigne Mbr consists chiefly of dark bedded limestones with stromatoporoid and colonial rugose corals.

Stratotypes: Different outcrops east of Huccorgne.

Area: Eastern part of the northern border of the Namur Synclinorium.

Thickness: about 75 m in the type area.

Age: Middle Frasnian, probably lower part of *hassi* sl conodont Zone to early *rhenana* Zone (Coen-Aubert & Lacroix, 1999).

3.2.17. Franc-Waret Formation - FRW

Authors: Stainier, 1892; Lacroix, 1999e.

Description: Greenish-greyish shales with a few calcareous-dolomitic beds overlying either the Rhisnes Fm or Aisemont Fm and overlaid either by sandy beds or by an oolitic hematite.

Type area: Franc-Waret, about 10 km north-east of Namur. Because of the poor nature of the exposures a formal stratotype cannot be designated.

Area: Northern border of the Namur Synclinorium.

Thickness: About 10 m.

Age: Latest Frasnian -? Early Famennian.

4. Famennian lithostratigraphic units

4.1. Introduction

The base of the Famennian stage is defined at Coumiac, Montagne Noire, France (Klapper et al., 1993). The limit with the overlying Tournaisian stage is defined at La Serre, Montagne Noire, France (Paproth et al., 1991).

Numerical ages for the Famennian span the interval from 370 ± 5 Ma to 355 ± 5 Ma. Racki (1999) reviews the various hypotheses for the Late Devonian mass extinction near the Frasnian-Famennian boundary, but the prime causation of this event remains uncertain.

In Belgium, the Famennian lithostratigraphic units are outcropping in the Namur and Dinant Synclinoria, the Vesdre Nappe and the Theux Window. The pioneer works concerning the Famennian stage are those of Murlon (1875-1886). Bellière (1954) made an up-dated synthesis in the "Prodrome d'une description géologique de la Belgique". In 1965, Bouckaert & Ziegler gave a conodont stratigraphy of the Famennian stage but the first complete biostratigraphical scale in the type localities in the Dinant Synclinorium was published by Bouckaert et al. (1968). Additional sedimentological and micropaleontological data may be found in Thorez et al. (1977) and Dreesen & Thorez (1980, 1994). A revision of the late Famennian miospore zonation scheme in eastern Belgium was presented by Maziane et al. (1999). An assessment of the old Frasnian/Famennian boundary at Senzeille is due to Bultynck & Martin (1995).

A schematic frame of the Famennian lithostratigraphic units is given in figure 7. As a general trend, the Famennian stage corresponds to a regressive megasequence with oscillating movements due to short terms transgressive pulses. Two main groups, which are mainly composed of siliciclastic rocks, may be distinguished, namely the Famenne and the Condruz Grps. Depositional environments comprise juxtaposed continental, restricted marine and shallow marine environments, including alluvial, lagoonal, evaporitic, tidal, sand barrier and fore-barrier settings. A new transgressive system overlay the Condruz Grp. It consists of interbedded siliciclastic and carbonate rocks of the Etroeungt = Comblain-au-Pont Fm, eventually with biostromal units (Dolhain Fm).

All Belgian and French geologists recognize the necessity to subdivide the Famennian stage into four substages: Lower, Middle, Upper and Uppermost (= Strunian) Famennian. However, an international acceptance has not been reached on this proposal (see Ziegler & Sandberg, 1997; Streel et al., 1998). A comparison between the lithostratigraphic units and the chronostratigraphic subdivisions based on biozones is given in table 1.

4.2. Descriptions

4.2.1. Famenne Group - FAM

Authors: d'Omalius d'Halloy, 1839; Thorez & Dreesen, 1986.

Description: The Famenne Grp is essentially made up of green (sometimes violet) shales or pelites alternating with more silty beds. Siltstone beds are increasing towards the top. Locally, the group is rich in carbonate nodules (of some cm long) and in lenticular sandy or calcareous-sandy beds (of some cm thick) containing crinoids and brachiopods accumulations (among which, rhynchonellids). Fossils are often decalcified. The Famenne Grp contains one or several oolitic hematite

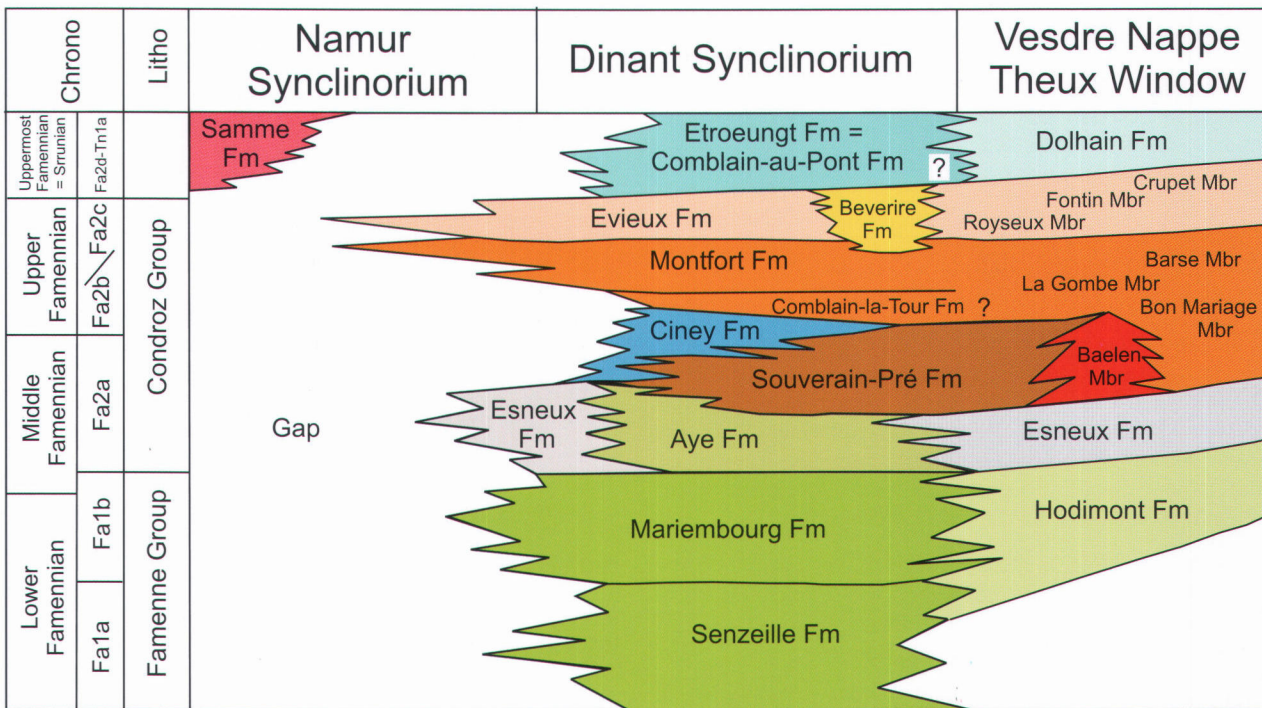


Figure 7. Schematic distribution of the Famennian lithostratigraphic units. Thickness and extent of the formations are not at scale.

Table 1. Correlations based on biozones of the Famennian lithostratigraphic units with the chronostratigraphic subdivisions (After Thorez & Dreesen, 1977, modified with the collaboration of M. Streeel).

STANDARD CONODONT ZONES Ziegler & Sandberg, 1990	FORMER CONODONT ZONES Sandberg & Ziegler 1973		MGM Namur 1974	MIOSPORE ZONES Streeel, In: Dreesen et al., 1993 Loboziak et al., 1994 Maziane et al., 1999	RYNCHONELLIDAE ZONES Sartenaer, 1980 and earlier papers	FORAMINIFER ZONES Conil et al., 1986	CHRONO-STRATIGRAPHY Streeel et Former Belgian al., 1998 terminology	LITHO-STRATIGRAPHY Dreesen & Thorez, 1994 Thorez & Dreesen, 1997
	Upper	Lower						
<i>Sulcata</i>	Upper	<i>Protognathodus fauna</i>		VI		?	"Tn 1b"	Hastière
<i>praesulcata</i>	Late		51	LN			?	?
	Middle		(50) 48	LE		Quas.konensis Quas.kobeitusana	"Tn 1a"	Etroeungt Comblain-au-Pont Dolhain
<i>expansa</i>	Early		47	LL		Quas.radiata	Fa 2d	Evieux Beverire
	Late	<i>costatus</i>	45	VH		Quas.regularis ?		
<i>postera</i>	Middle		43					Montfort
	Late	<i>styriacus</i>	41	VCo			Fa 2c	
<i>trachytera</i>	Early		40			Quas.communis		Comblain-la-Tour Ciney
	Late	<i>vellifer</i>	39				Fa 2b	Souverain-Pré Baelen
<i>marginifera</i>	Early		38	GF		Quas.bella		Esneux
	Late	<i>marginifera</i>	37				Fa 2a	Aye
<i>rhomboidea</i>	Upper	<i>rhomboidea</i>	36	GH	<i>letiensis</i>			
	Lower							
<i>crepida</i>	Late			?	<i>gerardimontis albinii dumonti</i>		Fa 1b	Mariembourg
	Early	<i>crepida</i>					Fa 1a	Senzeille
<i>triangularis</i>	Middle							
	Early	<i>triangularis</i>			<i>omallusi lentiformis crenulatum triaequalis (nux) praetriaequalis lecomptei (praenux)</i>		Fr 3	Matagne
<i>linguiformis</i>		<i>gigas</i>						

beds hypothetically attributed to debris-flows and characterizing a fluxo-turbiditic mechanism.

Former name: Famenne shales or schists, subdivided into Senzeille "assise" in the lower part and Mariembourg "assise" in the upper part; also named Famenne Fm in many recent works.

Stratotype: see Senzeille and Mariembourg Formations.

Area: Namur and Dinant Synclinoria. The Famenne Grp pass laterally to the Hodimont Fm in the Vesdre Nappe.

Thickness: 0 to < 50 m at the northern side of the Namur Synclinorium; 50 to 60 m at the southern side of the de Namur Synclinorium and at the northern side of the Dinant Synclinorium; 260 m in the Silenrieux-Walcourt area; 400 m in the Achêne-Leignon area (central part of the Dinant Synclinorium); maximum development on the southern side of the Dinant Synclinorium.

Age: Lower Famennian (Fa1a and Fa1b-c units, corresponding respectively to the old Senzeille and Mariembourg "assises"); *Palmatolepis triangularis* and *Palmatolepis crepida crepida* conodont biozones.

Remark: To consider Mariembourg and Senzeille as lithological units is questionable as for the limit between them is essentially based on paleontological markers or on a discrete (condensed) oolitic ironstone bed. Indeed, up to now (in 2001), in the various sheets of the new geological map of Wallonia, the distinction between them has not been made. The authors refer to the Famenne Fm, but the terminology of Famenne Grp, used by Thorez & Dreesen (1986), is preferred.

4.2.2. Senzeille Formation - SEN

Authors: Gosselet, 1877, 1880b; Sartenaer, 1960.

Description: Greenish, argillaceous shales, with thin interbedded sandstone or limestone layers.

Stratotype: Senzeille, former railway trench, south of the former railway station.

Area: Namur and Dinant Synclinoria.

Thickness: ±40 m in the Namur Synclinorium; 150 m at the southern margin of the Dinant Synclinorium.

Age: Lower Famennian (Fa1a). *Palmatolepis triangularis* conodont zones. *Brachiopod succession:* *Pampecilorhynchus lecomptei*, *Eoparaphorhynchus triaequalis praetriaequalis*, *E. triaequalis triaequalis*, *Tenuisnurostrum crenulatum*, *Evanescirostrum. lenti-formis*, *Ptychomaletaechia omaliusi*.

Remarks: See comment in the Famenne Grp section concerning the validity of the concept of Senzeille Fm.

Senzeille is sometimes written in the literature with a s, sometimes without s. After the Royal Decree of the 23th of December 1963, the word must be written without s.

4.2.3. Mariembourg Formation - MAB

Author: Gosselet, 1879b.

Description: Greenish, purplish-blue or reddish argillaceous shales, with nodules or thin interbedded arenaceous rocks or limestone layers.

Stratotype: North of Mariembourg, slopes of the Roly road.

Area: Namur and Dinant Synclinoria.

Thickness: Very variable.

Age: Lower Famennian (Fa1b-c). *P. crepida* conodont zone. The base of the Mariembourg Fm corresponds at Silenrieux to the base of the *P. dumonti* zone.

Remark: See comment in the Famenne Grp section concerning the validity of the concept of Mariembourg Fm.

4.2.4. Hodimont Formation - HOD

Authors: Laloux et al., 1996.

Description: In the type locality, the Hodimont Fm is made up of grey greenish micaceous shales (siltstones) occurring in decimetric to metric thick beds, with locally, numerous decimetric limestone nodules containing brachiopods and goniatites. The Hodimont Fm also contain several (locally, at least 4) levels of oolitic hematite lenticular beds, up to ± 1 m thick, made up of mottled sandy limestones with crinoids, brachiopods and cephalopods. The lowermost oolitic hematite bed is considered as the base of the formation; the uppermost, as the top.

Stratotype: Hodimont, near Verviers. Reference section: La Grappe street, Dison.

Area: Vesdre Nappe, Theux Window.

Thickness: 50 to 110 m.

Age: Lower Famennian (Fa1a) and base of the Middle Famennian (Fa2a). The lowermost hematite bed corresponds to a condensation of the 2 Lower Famennian conodont zones (*P. triangularis* and *P. crepida*); the uppermost hematite bed, to a condensation of parts of the 2 first conodont biozones of the lowermost Middle Famennian (*Palmatolepis rhomboidea* and *Palmatolepis marginifera marginifera*). The presence of goniatite *Cheiloceras* in the two upper hematite levels is an important marker for international correlations.

4.2.5. Condroz Group - CON

Authors: d'Omalus d'Halloy, 1839; Thorez et al., 1977, 1988; Thorez & Dreesen, 1986.

Description: In the Dinant Synclinorium, the Vesdre Nappe and the Theux Window, the Condroz Grp is made up of interfingering siliciclastic formations which are coarser-grained than those of the Famenne Grp and contain subordinate carbonate. In the lower part, shales (Aye Fm), pass laterally to siltstones and sandstones (Esneux Fm). They are overlaid by nodular limestones (Souverain-Pré Fm) or by both carbonate and siliciclastic rocks (Ciney Fm). The Monfort Fm (and the

time-equivalent Comblain-la-Tour Fm), situated in the middle of the Condroz Grp, is essentially made up of sandstones. It is surmounted by the Evieux Fm (and the time-equivalent Beverire Fm), a complex of shale and argillaceous micaceous sandstones.

Stratotypes: Ourthe valley, between Esneux and Comblain-Fairon.

Area: Namur and Dinant Synclinoria; Vesdre Nappe, Theux Window.

Thickness: 290 to 350 m in the Dinant Synclinorium (350 m in the Ourthe valley)

Age: Middle and Upper Famennian (Fa2a, b and c). *Palmatolepis rhomboidea* to *Bispathodus costatus* or to *Palmatolepis gracilis expansa* conodont biozones.

Remarks: The former name of the Condroz Grp is "Condroz psammites". Originally, the name corresponded to a wide stratigraphic range, from part of the Middle Frasnian to the Strunian. Later on, it was restricted to gather the Evieux and Monfort Fms. Thorez et al. (1977), Thorez & Dreesen (1986) and others in more recent papers consider all the formations ranging from the Esneux/Aye Fms (in the lower part) up to the Evieux Fm (in the upper part) as belonging to the Condroz Grp.

4.2.6. Esneux Formation - ESN

Author: Murlon, 1886.

Description: The Esneux Fm (former name: stratoid "psammite" of Esneux or Esneux "assise") consists of cm to dm-, sometimes up to m-, and even several m-thick green to olive green beds of weakly micaceous siltstone and fine-grained sandstone. Both rocks are feldspathic to arkosic. They are eventually interbedded with thin shaly intercalations. The Esneux Fm is often affected by chevron tight folds. Sedimentary structures are common: planar parallel-laminations, cross-beddings, small load-casts, bioturbations, etc. Remnants of decalcified fossils (crinoids, brachiopods) are also sometimes abundant. The arenaceous sediments have been interpreted as subtidal marine deposits. The transition to the overlying Souverain-Pré Fm is characterized by the occurrence of light grey crinoidic limestone beds in the shales. Laterally, to the south, the sandstone beds alternate with lenticular layers of siltstones and shales announcing the Aye Fm facies.

Stratotype: Ourthe valley, railway trench, south of the Esneux railway station.

Area: Namur Synclinorium, north of the Dinant Synclinorium, Vesdre Nappe, Theux Window.

Thickness: 25 to 150 m in the Vesdre Nappe; 250 m in the Hermeton and Lesse valleys, as well as in the Silenrieux-Walcourt area; 400 m in the Achêne-Leignon area (including the Aye Fm).

Age: Base of the Middle Famennian (Fa2a). *P. rhomboidea* and early *P. marginifera* conodont zones.

4.2.7. Aye Formation - AYE

Authors: Bouckaert et al., 1968; Thorez et al., 1977.

Description: As pointed out by Bouckaert et al. (1968), the Esneux Fm passes laterally in the southern part of the Dinant Synclinorium (i.e. in a more offshore position) to the Aye Fm (former name: Aye shales or schists). The dominant lithology is that of greenish shale with alternating interbedded greenish argillaceous platy siltstone beds and lenticular (some cm thick) fine-grained sandstones and siltstones. Bioturbation is important. Brachiopods accumulations and limestone beds are locally frequent. The overall paleobathymetry for the Esneux and Aye Fms is that of a subtidal wave-influenced environment. Cross-bedding structures are related to storm current origin (tempestitute).

Stratotype: area of Houyet and Aye.

Area: South of the Dinant Synclinorium; north of the Philippeville Tectonic Unit.

Thickness: at least 140 m in the Silenrieux area; 220 m in the Hermeton valley.

Age: Base of the Middle Famennian (Fa2a). *P. rhomboidea* conodont zone.

4.2.8. Souverain-Pré Formation - SVP

Authors: Murlon, 1875; Dreesen et al., 1985.

Description: The most representative rocks of the Souverain-Pré Fm (former name: Souverain-Pré "macigno") are metric-thick layers of nodular limestones with shaly to silty cement. The nodules are often aligned along the stratification and dissolved, giving rise to cellular alignments, very characteristic of the formation. Bioclastic character (crinoids, brachiopods, bryozoans) is often marked, especially in the limestone nodules. Decimetric beds of calcareous sandstones are also interbedded in the limestones. The Souverain-Pré Fm is interpreted as a "back-reef" facies of crinoidic mud mounds named the Baelen Mbr and described hereafter.

In the Dinant Synclinorium, the Souverain-Pré Fm passes laterally, in a more inshore direction, to the Ciney Fm. At the bottom of the Souverain-Pré Fm, limestone and thin sandstone beds alternate, forming the transition to the underlying Esneux Fm. The transition zone between the Souverain-Pré and the lateral or overlying Ciney Fm is gradual and characterized by the occurrence of more sandy facies with discrete sedimentary structures.

In the Vesdre Nappe, the Souverain-Pré Fm passes laterally to the east to the Baelen Mbr (former name: Crinoidic Red Marble of Baelen). This is a reef mud mound forming a heterogenous limestone complex. The marble s.s. consists of relatively pure fine-grained limestones, occurring in massive beds, rubefied, and frequently interbedded with clearer coarse-grained limestones. Crinoids, stromatolites and slumps are abundant. The marble is restricted to the central part of the complex and is surrounded by sandy or argillaceous,

nodular limestones, very rich in crinoids, and micaceous, carbonate sandstones.

Stratotype: Ourthe valley, railway trench, Souverain-Pré railway station.

Area: Dinant Synclinorium, Vesdre Nappe, Theux Window.

Thickness: variable: 50 to 120 m in the Dinant area; 80 to 140 m in the Achêne-Leignon area; 120 to 180 m in the Silenrieux area; 80 to 100 m in the Vesdre Nappe. Baelen Mbr: 20 to 150 m.

Age: The Souverain-Pré Fm is a diachronous formation of Middle Famennian age (Fa2ab). At Blaimont, the formation corresponds to the *Scaphignathus velifer* conodont zone; at Houyet and in the Vesdre nappe, it covers the *P. marginifera* zone and the lower part of the *Sc. velifer* zone. In the Achêne-Leignon area, the formation starts with the *P. marginifera* zone and covers the base of the *Palmatolepis rugosa trachytera* zone. The Baelen Mbr is dated of the Middle Famennian (Fa2a), late *P. marginifera* zone.

4.2.9. Ciney Formation - CIN

Authors: Thorez et al., 1977; Dreesen & Thorez, 1980.

Description: The Souverain-Pré Fm passes laterally to the north-northeast, i.e. in a more inshore direction, to a more sandy facies defined as the Ciney Fm. Indeed, the Ciney Fm is essentially made up of fine-grained micaceous sandstones and siltstones with nodular limestone intercalations occurring both to the top and the bottom, and with stratified limestones to the top only. The series starts with metric to plurimetric-thick bars of fine-grained laminated massif carbonate sandstones containing long flattened dolomitic nodules. Sandstones surmount them, with carbonate nodules alternating with metric-thick beds of grey siltstones and sandstones taking a yellow ocher or orange brown weathering patina (due to iron dolomitic cement). The main sedimentary structures are planar parallel laminations, cross-beddings, hummocky cross-beddings and load casts. Its depositional environment has been defined as distal subtidal. A Dorinne Mbr is distinguished at the lower part of the formation.

The Ciney Fm wedges out northwards where it disappears between the Esneux and Comblain-la-Tour Fms.

In the geological maps Hastière-Dinant (Delcambre & Pingot, 1993) and Achêne-Leignon (Boulvain et al., 1995), the Ciney Fm comprises all the Famennian rocks overlying the Souverain-Pré Fm. In the Silenrieux-Walcourt geological map (Dumoulin & Marion, 1997), the Etroeungt Fm was distinguished from the Ciney Fm, although both were represented by the same color, as the poor outcrops of the Etroeungt Fm did not permitted an accurate mapping.

Stratotype: Quarries around Ciney, in the Bocq valley.

Area: Dinant Synclinorium. The Ciney Fm is well developed in the Dinant area, but is lacking in the Ourthe valley, south of Liège.

Thickness: 200 to 300 m for the Ciney and Etroeungt Fms in the Silenrieux-Walcourt area; 250 to 300 m in the Dinant area (including 120 m for the Etroeungt Fm at Hastière); > 300 m in the Rosée borehole.

Age: Upper part of the Middle Famennian (Fa2b). *Sc. velifer* and *P. trachytera* conodont zones.

4.2.10. Comblain-la-Tour Formation - CLT

Authors: Thorez et al., 1977, 1988; Thorez & Dreesen, 1986.

Description: The Comblain-la-Tour Fm is essentially a sandy deposit with arkosic beds, interlayered with thin beds of more clayey micaceous material and occasional crinoidal limestones. It has been related to an open marine-proximal subtidal depositional environment. Members are also distinguished: the Poulseur Mbr to the N-NE and the Haversin Mbr to the S-SW.

Stratotype: Ourthe valley, old quarry of Comblain-la-Tour.

Area: Dinant Synclinorium.

Thickness: ±150 m at Comblain-la-Tour.

Age: Upper part of the Middle Famennian (Fa2b). *Sc. velifer* and *P. trachytera* conodont zones in the Hamoir-Ferrière area.

4.2.11. Montfort Formation - MFT

Authors: Davreux, 1833; Murlon, 1875; Thorez et al., 1977.

Description: The Montfort Fm (former names: Montfort assise, Montfort "psammites" or paving sandstone of Monfort) is made up of micaceous, dark grey bluish, sometimes nearly black by weathering, thick (up to 5 m) sandstone beds, practically without any shaly intercalations. Locally, at the top, the rocks take a maroon ("lie de vin" in french) color, especially in the Vesdre Nappe. Plant debris are abundant. The Montfort Fm represents a sand barrier complex. It was subdivided by Thorez et al. (1977) into three members, respectively from bottom to top:

1. the Bon-Mariage Mbr: forebarrier environment, with rhythmic deposits of a typical tidal-flat environment, with subtidal, intertidal and occasionally supratidal environments;
2. the La Gombe Mbr: sand barrier environment itself, virtually barren of limestone or calcareous sediment; the rocks are highly sandy, arkosic, and organized in at least one meter thick beds, exhibiting a systematic reverse grading; clay material occurs occasionally interlayered within the sandy beds;
3. and the Barse Member: back-barrier environment with typical lagoon-evaporitic (sabkha) sedimentary deposits. The carbonate material is always a "primary" dolomite, without any fossil content.

Stratotype: Ourthe valley, railway trench, 1700 m south of the Esneux railway station.

Area: Part of the Namur Synclinorium, Dinant Synclinorium, Vesdre Nappe, Theux Window.

Thickness: 170 m in the Dinant Synclinorium of which 150 m in the Ourthe valley; ± 350 m for both the Montfort and Evieux Fm in the Vesdre Nappe.

Age: Middle (Fa2b) to Upper (Fa2c) Famennian. Late *Sc. velifer*, *Polygnathus styriacus*, *Palmatolepis perllobata postera*, early *Palmatolepis gracilis expansa* conodont zones.

4.2.12. Evieux Formation - EVX

Authors: Murlon, 1875; Thorez et al., 1977.

Description: The Evieux Fm (former names: Evieux "assise", or Evieux "psammites") consists of a complex of shales and argillaceous, sometimes very micaceous sandstones, with towards the top, subordinate carbonate sandstones often decalcified. Plant debris are very abundant. The Evieux Fm was subdivided by Thorez et al. (1977) into three members, from bottom to top:

1. the Royseux Mbr, with arenaceous red beds, related to sabkhas, interlayered with supratidal evaporitic dolomites;
2. the Fontin Mbr, with dolomites containing subla-geonal ostracods and oncolithic micrites;
3. and the Crupet Mbr, with "continental" red beds.

Area: Namur and Dinant synclinoria, Vesdre Nappe, Theux Window.

Thickness: 120-200 m in the Dinant Synclinorium (200 m in the Ourthe valley).

Age: Upper (Fa2c) to Uppermost (Fa2d) Famennian. Upper *P. styriacus*, lower to middle *Bispathodus costatus*, and *P. expansa* conodont zones.

4.2.13. Beverire Formation - BEV

Authors: Thorez et al., 1977, 1978; Thorez & Dreesen, 1986.

Description: The Beverire Fm faces but overlap somewhat both the Montfort and Evieux Fms within a southern, more offshore, position. This formation appears to have been deposited as a rhythmically organized succession of high-interdital to supratidal sediments. Most of the limestones are micritic.

Area: The Beverire Fm is well developed in the southern part of the Ourthe valley and seems to be restricted to this area.

Stratotype: Old quarries at Comblain-au-Pont, left bank of the Ourthe river. These are however either banked up or in a private property.

Thickness: ± 90 m in the stratotype area.

Age: Upper (Fa2c) to Uppermost (Fa2d) Famennian. Upper *P. styriacus*, lower to middle *B. costatus* and *P. expansa* conodont zones.

4.2.14. Etroeungt Formation - ETR

Authors: Gosselet, 1857; Barrois, 1913; Conil & Lys, 1980.

Description: The Etroeungt Fm is made up of several dm- to several m-thick beds of green shales and siltstones interbedded with argillaceous or carbonate, micaceous sandstones, often of yellow brown color. Interbedded nodular or lenticular beds of carbonate, often crinoidic, are also frequent. Three lithological units may be distinguished, respectively from bottom to top: a shale dominant unit, a sandstone dominant unit and a carbonate dominant unit (the latter corresponding to the Etroeungt Limestone s.s.).

Former names: Etroeungt zone or "assise"; Etroeungt limestone; Etroeungt Limestones and Shales.

Stratotype: Parcq quarry, Etroeungt, near Avesnes (N of France).

Area: Dinant Synclinorium.

Thickness: 120 m at Hastière and Yves-Gomezée; 200 m at Walcourt.

Age: Uppermost Famennian (Strunian, Fa2d-Tn1a). Biostratigraphical correlations between miospores and conodonts due to Maziane et al. (1999) indicate that the base of the *Retispora lepidophyta-Knoxisporites literatus* miospore biozone is correlated with the middle or late *P. expansa* conodont biozone and the base of the *Retispora lepidophyta-Indotriadites explanatus* microspore biozone with the early to middle *Siphonodella praesulcata* conodont biozone.

Remark: The Comblain-au-Pont Fm (formerly, Comblain-au-Pont zone or "sous-assise") is a synonym to characterize the same formation in Belgium, when moving eastwards.

4.2.15. Comblain-au-Pont Formation - CLP

Authors: Dufrenoy & de Beaumont, 1841-1848.

Eastwards time-equivalent in Belgium of the Etroeungt Formation. The Comblain-au-Pont "assise" was systematically represented in the various geological maps at the scale 1:40,000 published in the 1900s and situated east of the Samson valley.

4.2.16. Dolhain Formation - DOL

Authors: Laloux et al., 1996.

Description: The Dolhain Fm is characterized by 3 biostromal carbonate units, rich in fossils, interbedded within olive green micaceous shales and siltstones with thin sandy laminae. The uppermost biostrome is the thickest and contain abundant stromatoporoids (lamellar and globular), rugose corals (*Palaeosmillia aquisgranensis*, *Campophyllum flexuosum*) and tabular corals (*Syringopora*, *Yavorskia*).

Stratotype: Dolhain area, especially the section of the Trauty street at Dison.

Area: Vesdre Nappe, Theux Window.

Thickness: Total thickness: 30-40 m. The lowermost biostrome is ± 0.5 m thick; the middle biostrome, ± 2 m thick; the uppermost biostrome, 20-25 m thick.

Age: Uppermost Famennian (Strunian, foram Df3 subzone).

4.2.17. Samme Formation - SAM

Authors: Doremus & Hennebert, 1995.

Description: The Samme Fm is subdivided into three members, respectively from bottom to top:

1. the Bois de La Rocq Mbr: conglomerates, red and green sandstones, red shales to the bottom; sandstones with dolomitic cement to the top;
2. the Feluy Mbr: mainly limestones, sometimes oolitic, dolostones and less abundant sandstones;
3. and the Mévergnies Mbr: sandstones, often dolomitic, with shaly intercalations.

Stratotype: Samme valley.

Area: Western part of the northern limb of the Namur Synclinorium.

Thickness: 65 to 100 m.

Age: Bois de La Rocq Mbr: Strunian; upper part, Hastarian. Feluy and Mévergnies Mbrs: Hastarian.

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