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LATE DEVONIAN - EARLY CARBONIFEROUS EVENTS IN THE ARMORICAN MASSIF (WESTERN FRANCE) : A REVIEW

by

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(2 figures)

ABSTRACT. - In the main geological units of the Armorican Massif the evolution of the sedimentation around the Devonian-Carboniferous boundary shows a regressive trend, at least in the central and western part of the Armorican Median Syncline during early Famennian time. More or less accentuated glyptogenic processes are associated to such a late Devonian emersion, related to the Bretonic movements. Until the Upper Tournaisian or Lower Visean no firm evidence of true marine deposits is reported. However a "Strunian" and (or) a Tournaisian (*pro parte*) peculiar sedimentation (volcanic and volcanoclastic rocks, conglomerates, gravitational slide deposits, coal . . .) took place before the deposition of the Uppermost Tournaisian - Lower Visean limestones.

RESUME. - Dans les principales unités géologiques du Massif armoricain, l'évolution de la sédimentation, aux environs de la limite Dévonien-Carbonifère, montre une tendance régressive, au moins dans les parties centrales et occidentales du Synclinal armoricain médian, pendant le Famennien ancien. Des processus d'érosion plus ou moins accentués sont associés à une telle émersion à la fin du Dévonien, en relation avec les mouvements bretons. Avant le Tournaisien supérieur ou le Viséen inférieur, aucune évidence précise de véritables dépôts marins n'a été découverte. Cependant une sédimentation particulière (roches volcaniques, volcanoclastiques, conglomérats, dépôts de glissements, charbon . . .) a pris place au "Strunien" et (ou) au Tournaisien (*pro parte*) avant le dépôt des calcaires de la fin du Tournaisien et du Viséen inférieur.

1. - INTRODUCTION

Devonian and Lower Carboniferous deposits are both represented in almost all the principal geologic units of the Armorican Massif (fig. 1). However, while the very first Dinantian strata are roughly synchronous (diachronism usually smaller than a Stage time-interval), the age of the Devonian rocks cropping out in the vicinity, or directly in contact with these Lower Carboniferous deposits, is variable. In this brief review, mainly based on the most recent interpretations, we will compare the principal data illustrating the main sedimentologic events and the evolution of the basin during late Devonian to early Carboniferous time.

In order to take into account the disparity of the available data, three types of successions will be distinguished (fig. 2). The first one corresponds to the best documented regions, where the late Devonian and the early Carboniferous are both represented (e. g. Châteaulin and Ménez Bélair synclines).

The second deals with successions where late Devonian material is reworked in the Lower Carboniferous deposits (e. g. Saint-Julien-de-Vouvantes and Ancenis synclines). The third one will include the areas where Upper Devonian strata are lacking (Laval syncline and Cotentin).

As the aim of this paper is a brief review of the available data on late Devonian events in the Armorican Massif, neither fossil names nor very precise biostratigraphic subdivisions (e. g. spore Zones) will be referred to.

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2. - GEOLOGICAL UNITS WHERE UPPER DEVONIAN AND LOWER CARBONIFEROUS STRATA ARE BOTH REPRESENTED

2.1. - CHATEAULIN SYNCLINE

In the western part of the Armorican Median Syncline the Devonian succession is almost complete (Morzadec, 1983) in the Châteaulin syncline. From the Frasnian up to the early Famennian the main formations are arranged as follows. The Frasnian starts with the Traonliors Formation (70 m), a silty unit with sandstone levels (in the lower part), calcareous beds, nodules and some intraformational conglomerates. The recorded conodont fauna is indicative of the Lower *Asymmetricus* Zone. Resting on these beds are the siltstones and sandstones of the Goasquellou Formation (25-30 m), showing some sedimentary instability features (slumps, ball and pillow structures). The overlying Rostiviec Formation (20 m) consists of dark shales and limestones, with oolites and phosphatic nodules in its lower part. The fauna, mainly pelagic, includes pyritized goniatites, a huge number of styliolines, and conodonts of the Middle *Asymmetricus* Zone. The overlying, black shales of the Porsguen Formation (50 m) yield a pelagic and epipelagic fauna from calcareous and pyritous nodules. In addition, abundant and well-preserved plant remains suggest the vicinity of land areas (Babin *et al.*, 1976). The Frasnian-Famennian boundary is situated within this formation : Asteropyginae trilobites and the homoctenids disappear in the Lowermost Famennian while the goniatites genus *Cheiloceras* makes it first appearance. The local De-

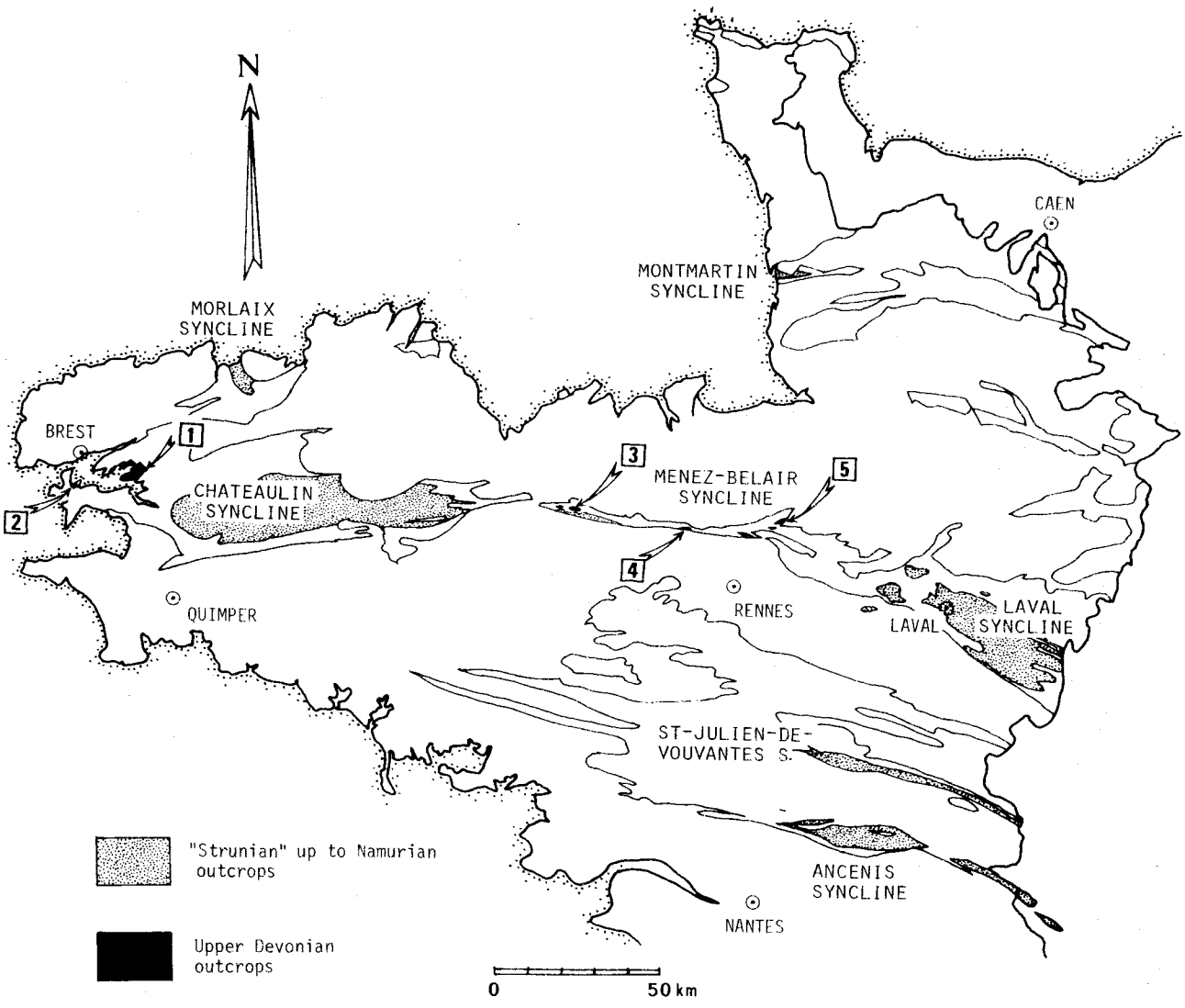

Figure 1. - Upper Devonian and Lower Carboniferous in the Armorican Massif.
The bordered numbers correspond to Upper Devonian outcrops (1. Plougastel-Daoulas and Rostiviec outcrops, see Morzadec, 1983; 2. outcrops in the vicinity of Le Fret, see Morzadec, 1983; 3. outcrops in the vicinity of Collinee and Rouillac, see Régnault, 1983; 4. outcrops in the vicinity of La Chapelle-Chaussée, see Paris, 1977; 5. outcrops of the Gahard Syncline, see Paris, 1986).

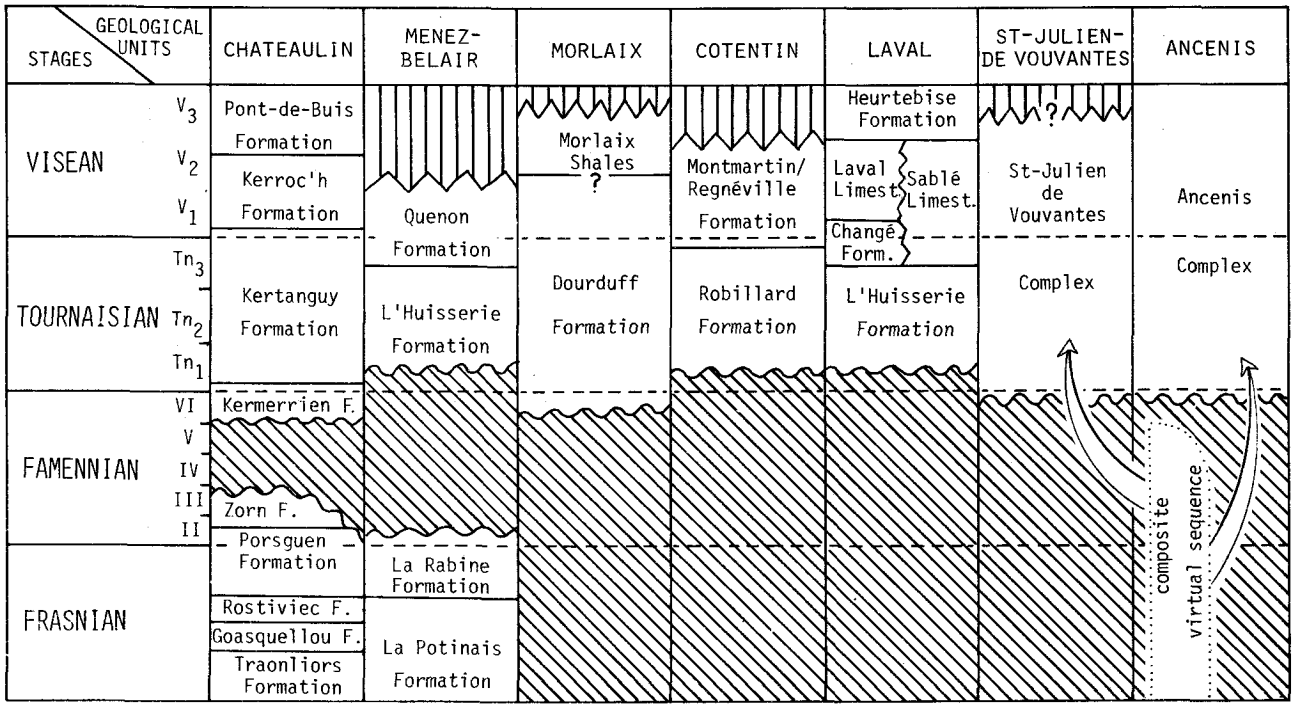

Figure 2. - Upper Devonian and Lower Carboniferous lithologic successions in the main geological units of the Armorican Massif.
Vertical hatching and broken lines symbolize the effects of the post-Variscan erosion.
Oblique hatching and wavy lines symbolize a stratigraphic hiatus and (or) the effects of the Bretonic erosion.

vonian succession ends with the Zorn Formation (20 m). These alternating strata of shales and finely laminated black limestones yield a few ostracodes and trilobites. Land source elements are more abundant (plant remains, spores). It is worth noting that the spore assemblages show a melange of Emsian up to Famennian (Fa2a) forms (Morzadec & Streel, 1980). The occurrence of these obviously reworked spores would support the existence of an important erosive process during early Famennian time. This seems to be related to the first effects of the Bretonic movements. Such an interpretation is in agreement with the occurrence of sedimentary instability features in this material (Guillocheau & Rolet, 1982). This regressive trend has very likely resulted in a general emersion during Famennian time, but later than Famennian III.

It is noteworthy that the early Famennian strata are never in contact with the younger deposits recorded in this region. Indeed the uppermost Famennian (Strunian) and the Tournaisian material occur southward with regard to the axial part of the Lower Paleozoic basin. No firm evidence of a marine environment is documented in the first deposits succeeding this gap, which is related to the Bretonic movements. These tectonic events have generated two families of folds associated with cleavage (Babin *et al.*, 1975; Morzadec, 1976; Darboux *et al.*, 1977; Darboux & Plusquellec, 1981). In addition volcanic (dykes) and plutonic activities took place during the early Famennian-uppermost Famennian time interval (Gravelle *et al.*, 1977; Thonon & Rolet, 1982).

These Bretonic sedimentologic, structural and magmatic events are followed by a new sedimentologic cycle beginning with the Kermerrien Formation. This lithologic unit corresponds to a thick sequence (600-900 m) of laminated dark shales, including volcanic flows, tuffites, conglomerates as well as olistolites and olistostromes (Rolet & Thonon, 1979; Rolet 1982; Guillocheau & Rolet, 1982). The black shales are referred to the uppermost Famennian (Strunian) on spore evidence (Deunff *in* Rolet & Thonon, 1979). The overlying Kertanguy Formation (300-500 m of volcanic and volcanoclastic rocks), unconformably resting on the Kermerrien Formation, is tentatively referred to the Tournaisian (Guillocheau & Rolet, 1982). Completing the Lower Carboniferous succession of the Châteaulin syncline are respectively the Kerroc'h (Lower Visean ?) and the Pont de Buis (Upper Visean-Namurian) Formations (viz Guillocheau & Rolet, 1982; Pelhâte, 1982). In this Lower Carboniferous sequence, the position of the Upper Tournaisian Quivit limestones, yielding a conodont fauna (viz Plusquellec *et al.*, 1982), is peculiar (filling up of residual depressions; see discussion *in* Plusquellec *et al.*, 1982, p. 7-8).

2.2. - MENEZ BELAIR SYNCLINE

Frasnian and Famennian deposits have been recently discovered in this structural unit, on top of a Lower Paleozoic succession beginning with early Arenigian rocks. These Upper Devonian strata are located in the central part of small synclines (Babin & Paris, 1973; Babin & Regnault, 1978; Paris, 1986). On the

other hand the Dinantian deposits are situated southward with regard to the main axis of the Ménez-Bélair syncline and are in contact with Ordovician and Silurian formations, as well as with Precambrian rocks (Paris *et al.*, 1982; Paris, 1986).

Some lithologic differences in the late Devonian succession exist between the western and eastern parts of the Ménez-Bélair syncline. Eastwards, dark siltstones with siliceous or calcareous nodules, representing the upper part of the Potinais Formation, yield a few goniatites, bivalves, numerous dacryoconarids and chonetacea. These latter have an early Frasnian age (Paris, 1981; Racheboeuf, 1981). Westwards, greenish sandstones located on top of the Bosquen Formation also yielded Lower Frasnian brachiopods (Régnault, 1980, 1983). In the whole area the youngest Devonian strata recorded are the black shales of the Rabine Formation. These pelagic and epipelagic faunas (goniatites, thin shelled bivalves, dacryoconarids . . .) of Frasnian to Famennian age, added to the peculiar sedimentologic characters of the formation, suggest an euxinic enviroment in this area during late Devonian time. In the lower part of the Rabine Formation, blue-green algal clusters are the most abundant component of the paleoplankton including on the other hand leiospheres, tasmanacea and a few acritarchs. It is worth noting that this palynological residue is devoid of land source material.

The youngest strata occurring at the topmost (or immediately above ?) the Rabine Formation (Paris, 1977) show an obvious regressive trend. These dark grey silstones yield abundant plant debris but no marine palynomorphs. Unfortunately poor exposure conditions do not permit an accurate analysis of all the different stages of the emersion process.

The lowermost Carboniferous material is exposed in two small outcrops. Westwards it corresponds to the Eréac Group (Régnault, 1980, 1983) and westwards it belongs to the l'Huisserie Formation (Barrois, 1895; Paris *et al.*, 1982; Paris, 1986). In both regions these strata are strongly influenced by an acid volcanic activity (rhyolites, tufs . . .). In the l'Huisserie Formation, conglomeratic horizons (with reworked Upper Ordovician sandstones) and silty to black argillaceous levels (with plant remains) are present (see lithological description *in* Paris *et al.*, 1982). The finer material has yielded a poorly preserved spore assemblage of Lower to Middle Tournaisian age (viz Le Herissé *in* Paris *et al.*, 1982). Because of the sedimentologic evidence and the palynofacies (extremely abundant plant microdebris, lack of marine microfossils) it seems likely that the l'Huisserie Formation was deposited in a lacustrine or deltaic environment. The local Dinantian succession ends with the uppermost Tournaisian (Tn3c) and lowermost Visean (V1) limestones of the Quenon Formation (for biostratigraphic discussions, see Pelhâte & Weyand *in* Paris *et al.*, 1982).

The foregoing data clearly indicate that an emersion took place in this area during late Famennian and early Tournaisian time. It was accompanied, or followed by an important glyptogenic process related to the epeirogenic movements of the "Bretonic phase". The disconformity between the Upper Devonian and the Lower Carboniferous strata is poorly documented due to the later effects of the Variscan orogeny (see discussion *in* Paris *et al.*, 1982, p. 25-26) and to poor exposure conditions.

2.3. - MORLAIX SYNCLINE

The Lower Paleozoic sequence of this structural unit is poorly documented (Cabanis, Chantraine & Herrouin, 1979). There is no evidence of mesodevonian formations. The only Upper Devonian deposits recorded in the literature have been referred to the uppermost Famennian (Strunian) because of their spore assemblages (Coquel & Deunff, 1977). The corresponding sequence, the Morlaix Formation, is composed of black shales and wackes, associated in its lower part with volcanic elements (tuffites). Blocks of chaotic conglomerates occur in this Morlaix Formation (Rolet *et al.*, 1984). Among elements of various lithology and origin (sandstones, lava, tufs, granites . . .) are limestones yielding Upper Tournaisian-Lower Visean conodonts (Pelhâte *in* Rolet *et al.*, 1984). Consequently the settlement of the elements of this conglomerate is at the most Lower Visean in age. Such a stratigraphical conclusion does not fit with the Strunian age of the material forming the matrix of this chaotic conglomerates. Consequently the Upper Devonian-Lower Carboniferous sedimentation in the Morlaix area is still too obscure to provide relevant data for the problem of the Bretonic movements.

3. - GEOLOGICAL UNITS WHERE UPPER DEVONIAN STRATA ARE STILL UNKNOWN

3.1. - LAVAL SYNCLINE

In this eastern part of the Armorican Median Syncline the local Devonian succession is far from being complete as strata younger than the Upper Emsian have not been recorded in the whole area. The younger Devonian deposits are the fossiliferous limestones, siltstones and shales of the Marollières Formation (*Laticostatus* conodont Zone; see Morzadec, 1983). The lack of meso- and neodevonian sequences may be related to an emersion as well as to erosive events. However, the Marollières Formation does not display any regressive character so that if a Devonian emersion took place in this area, this was after Upper Emsian time. On the other hand, until now, neither mesodevonian nor neodevonian rocks have been identified as reworked material in the overlying early Carboniferous conglomerates (including Lower Devonian pebbles). Consequently the sedimentologic evolution of the Laval Syncline cannot be accurately documented for the uppermost

Emsian to early Carboniferous time interval.

The Carboniferous sedimentation begins with the thick terrigenous sequence of the l'Huisserie Formation, unconformably overlying various Lower Paleozoic deposits (Pelhâte, 1971; Plaine, 1976). The effects of an important volcanic activity came out in the lower part of the formation (ignibritic rhyolites, tufs, tuffites, basaltic lava flows . . . see Boyer, 1974; Plaine, 1976; Le Herissé & Plaine, 1982; Mary & Le Gall, 1984). The acid volcanic material provided a Rb/Sr radiometric age of 342 ± 6 M.A. (Boyer, 1974). Based on very preliminary investigations on spore assemblages from the lowermost part of the l'Huisserie Formation (Le Herissé, Paris, unpublished data) *R. lepidophyta* assemblages seem to be lacking. However, these palynological data are too scarce and too poorly documented (spores usually rare and poorly preserved) to provide at the present time any reliable stratigraphical control. In the upper part of the l'Huisserie Formation a well-preserved microflora (spores and plant remains) indicates a Middle to Upper Tournaisian age (see Streel *in* Lejal *et al.*, 1982). Another spore assemblage, recently discovered near Beaumont Pied-de-Boeuf, suggests a Lower Tournaisian (Tn1b) age for this material (lower part of the L'Huisserie Formation) (Le Herissé *in* Houlgatte *et al.*, 1986).

No firm evidence of a marine environment can be observed in the lower part of the l'Huisserie Formation. But in its upper part a marine fauna has been described (Milon, 1923). The overlying Change, Laval/Sablé Formations of Upper Tournaisian (Tn3c) up to Visean age are exclusively deposited in a marine environment (see lithological description and age assignment in Pelhâte, 1971; Houlgatte *et al.*, 1986).

Obviously in the Laval Syncline, the late Devonian sedimentologic evolution cannot be seriously argued. Nevertheless, as Lower Paleozoic elements are reworked in the earliest Carboniferous formation, an important glyptogenic event, associated to a large uplift, took place before the Lower to Middle Tournaisian. These events are related to the Bretonic movements responsable of the emersion of the whole area but apparently non-cleavage generating (Rolet, Le Gall *et al.*, 1984). Concerning the absence of Middle and Upper Devonian outcrops in the Laval syncline two hypothesis are yet in discussion. The first one (Houlgatte *et al.*, 1986) considers that a lack of sedimentation, related to late Acadian movements, occurred during meso- and neodevonian time (this hypothesis would be supported by the non-record of Middle and Upper Devonian reworked material in the L'Huisserie Formation). The second one is in favour of a rather continuous sedimentation, up to Upper Devonian time, in the Laval area. This hypothesis (viz Paris, 1981, p. 46-47) is based on the Ménez-Bélair example (cf. supra) where Middle and Upper Devonian elements also seems to be lacking in the local conglomerate of the L'Huisserie Formation although recent investigations demonstrated the occurrence of meso- and neodevonian outcrops in the neighbouring Gahard Syncline.

3.2. - COTENTIN AREA

The Lower carboniferous deposits are restricted to the Montmartin Syncline whereas the Devonian strata are well represented northwards, in the Siouville Syncline and in the La Haye-du-Puits area.

In the Montmartin Syncline the stratigraphic assignment of the Hyenville Formation was and is still debated (see references *in* Poncet, 1974; Perroud *et al.*, 1984). This sequence of red sandstones and silty shales, previously referred to the Cambrian, Silurian or Carboniferous, appeared to be definitively dated on organic microfossil evidence (Doubinger & Poncet, 1964). However, the Upper Devonian age proposed by Doubinger, Drot & Poncet (1966) raised new problems (see discussion *in* Doré, 1969, Chauris, 1971, Robardet, 1981), because the occurrence of Chitinozoans in such red deposits was anomalous. Moreover, the suggested, late Devonian age of the Hyenville Formation, which begins with a conglomeratic horizon, implies the existence of Bretonic orogenic events earlier than those in the neighbouring areas. Such a peculiar feature was not in agreement neither with the available palaeobiogeographic data nor with the sedimentologic characters of the Cotentin Lower Paleozoic succession (closely related to that of central Brittany). Obviously, the stratigraphic assignment of the Hyenville Formation is not based on reproductible micropalaeontologic evidence since all the new investigations carried out have been negative (see Paris *in* Perroud *et al.*, 1984, p. 544). Consequently this age is very questionable. In all likelihood the Hyenville Formation is older than fossiliferous Upper Ordovician sandstones geometrically resting on it (eastern part of the Montmartin Syncline) and may belong to the Early Ordovician, the same as the Plourivo and Erquy-Frehel red beds. In the Montmartin unit the Robillard Formation is the oldest Carboniferous deposit (Poncet, 1968). It is represented by more or less coarse sandstones with thin silty or shaly interbeds. From sedimentologic features quoted by Poncet (1974, p. 64-65) this material seems to have been deposited in an environment without firm marine influences (swamp area). Such an environment is well supported by the palynofacies recorded from black silty shales interbeds (plant debris plus spores; but apparently no marine microfossils). The spore assemblage reported by Poncet (1974, p. 64-65) is indicative of the Lower Carboniferous in spite of its poor preservation. As the limestones of the overlying Montmartin-Regnéville Formation yield an early Visean fauna and microfauna (see paleontologic references and discussion *in* Pelhâte & Poncet, 1971) it seems likely that the Robillard Formation is of Tournaisian age.

If one accepts an Early Ordovician age for the Hyenville Formation, no meso- or neodevonian strata occur at the present time in the Cotentin area so that

the emersion of this region, prior to the Tournaisian, cannot be precisely dated within the Lower Emsian to Tournaisian time interval. In all likelihood the lower Paleozoic succession in the Montmartin Syncline was quite complete (cf. above discussion on the meso- and neodevonian hiatus in the Laval Syncline). The present gap of Silurian and Devonian strata can be related to erosive processes associated with the Bretonic movements. With regard to the neighbouring Laval Syncline, it is noteworthy to emphazise the absence of any important volcanic and conglomeratic deposits in the Montmartin Syncline during Tournaisian time.

4. - GEOLOGICAL UNITS WHERE UPPER DEVONIAN MATERIAL HAS BEEN REWORKED IN LOWER CARBONIFEROUS DEPOSITS

4.1. - SAINT-JULIEN-DE-VOUVANTES SYNCLINE

For a long time, the Paleozoic succession of this unit was believed to end with Famennian deposits (viz Cavet & Lardeux, 1967; Babin *et al.*, 1972). Recently a new interpretation of the sequence occurring in the central part of the Saint-Julien-de-Vouvantes Syncline has been proposed (Dubreuil, 1984a). Outcrops previously attributed to the Silurian or to the Devonian are at the present time interpreted as allochtonous blocks, redeposited in the Saint-Julien-de-Vouvantes Complex, which is tentatively referred to the Dinantian (Dubreuil, 1984a, Dubreuil, in preparation). This new interpretation is well supported by the discontinuous feature and the random distribution of small Devonian outcrops such as the "shales and limestones of Pont-Maillet" (Eifelian), the shales, cherts, phosphatic nodules and limestones of "La Briantière" (Famennian II, III and IV) and the clymenid - bearing siltstones of "La Vallée" (Famennian V) (see Cavet & Lardeux, 1967).

If one accepts Dubreuil's interpretation suggesting the allochthonous origin of these rocks and especially those of Famennian age, the late Devonian sedimentation and the geological history of this area cannot be exclusively documented by this material. Because of their sedimentologic and faunistic affinities (closely related to the "mediterranean realm" for late Devonian time; Montagne Noire and Pyrénées type), these Famennian rocks would likely have been deposited originally in a more southern position (e.g. the Ancenis Domain *sensu* Paris & Robardet, 1977).

Paleontologic evidence is lacking for an accurate datation of the matrix of these allochthonous blocks (olistolites). However, the occurrence of upper Famennian elements redeposited in the Saint-Julien-de-Vouvantes Complex well supports the initiation of a gravitational sedimentologic process during the topmost Famennian or in all likelihood during Dinantian time.

In spite of poor biostratigraphic control for the age of the Saint-Julien-de-Vouvantes Complex itself, we are convinced that important geologic events took place before (and during) this sedimentation. Indeed, as this lithologic complex is resting on strata of varying age (Ordovician, Silurian and Lower Devonian), especially on the northern limb of the syncline, it seems likely that an erosive activity has destroyed a large part of the Lower Paleozoic succession (including the possible meso- and neodevonian deposits) before the uppermost Famennian or Dinantian. Such an erosive process, associated with a more or less late Devonian emersion, may be related to the Bretonic movements.

4.2. - ANCENIS SYNCLINE

Because of its peculiar faunistic and lithologic features during lower Paleozoic time, this area has been regarded as an independent paleogeographic unit : the Ancenis Domain (see references *in* Paris & Robardet, 1977).

Small outcrops of Upper Devonian rocks are known in this region (see lithologic and paleontologic data *in* Cavet & Lardeux, 1967). These fossiliferous calcareous rocks (e.g. limestones and silty shales of l'Ecochère; Cop-Choux and Le-Fossé-Neuf Limestones . . .) of Frasnian or lowermost Famennian age (viz Cavet & Lardeux, 1967; Babin *et al.*, 1972; Blaise, Cavet & Dubreuil, 1983 . . .), greenish or reddish cherts and volcanic deposits, are included in the so-called "Culm Frasno-Dinantian" (Cavet, Lardeux & Rivière, 1970).

Recent investigations (Dubreuil, 1980; Dubreuil, 1984b) suggest that these Upper Devonian rocks as well as the olistostrome of the "Tombeau Leclerc" unit (including various Lower Paleozoic elements) have an allochthonous origin and would have been deposited by a gravitational sedimentologic process (Dubreuil, 1980; Rolet, 1982, p. 65). At the present time they are situated in the lower part of a thick sequence of greywackes including large conglomeratic deposits (e.g. the "Poudingue d'Ingrandes") in its upper part (Cavet, Lardeux & Rivière, 1970; Blaise, Cavet & Dubreuil, 1983). This Ancenis Complex (with very restricted marine influences) has yielded a rich Dinantian flora (Beaupère, 1972).

As expressed by Dubreuil (1984b) even if the late Famennian rocks of the Ancenis Syncline have been reworked (maybe by a gravitational slide process) they are representative of a more complete Upper Devonian sequence. This initial sequence was more or less condensed and showed Mediterranean affinities (viz Saint-Julien-de-Vouvantes Complex). In all likelihood the settlement of the Ancenis Complex was initiated at the earliest during uppermost Famennian time and can be related to the Bretonic movements. However, the available data do not permit to specify the importance of a possible erosive activity prior to the deposit of the Ancenis Complex.

5. - CONCLUSIONS

The late Devonian sedimentologic and erosive events mentioned above for the principal Armorican geological units, as well as tectonic activities (see Rolet *et al.*, 1984), are related to the Bretonic movements. The notion of "Bretonic phase" ("Bretonische Faltung") was first introduced by Stille (1928) in connection with the unconformity occurring in Barrois's geological maps between the Lower Paleozoic strata and the overlying Dinantian ones. For a long time the Bretonic movements were interpreted as a simple uplift of the whole area, and not as a true folding phase (Cogné, 1965, p. 239). More recently, deeper tectono-metamorphic and magmatic events, referred to early Bretonic movements, or better to the Ligerian orogeny, have been extensively documented for the southern Brittany regions (see references and discussions *in* Autran & Cogné, 1980, Rolet, 1982). As the aim of the present review is only dealing with sedimentologic processes this tectono-metamorphic aspect will not be discussed here.

From a sedimentologic point of view it seems likely that a major regional event took place during late Famennian to early Tournaisian time. Unfortunately the precision of the available stratigraphic control is variable (e.g. meso- and neodevonian strata are lacking in the Laval Syncline and in the Cotentin). However, the fact that in most of the investigated Armorican regions, a sedimentation with very limited or without marine influences begins in the uppermost Famennian to early Tournaisian well supports the assumption of an emersion during Uppermost Devonian time. This emersion, announced by the regressive trend registrated in early Famennian deposits (e.g. Châteaulin and Ménez-Bélair synclines) can be regarded as one of the manifestations of the Bretonic movements. In the best documented area (western part of the Châteaulin Syncline) this emersion took place during the Famennian III to Famennian V time interval. Locally, and especially on the limbs of the basin, the emersion could be more precocious so that older strata could be eroded and then reworked in the local latest Famennian deposits (see Morzadec & Streel, 1980).

In the southern regions (e.g. Ancenis Domain) a fictive Upper Devonian succession can be reconstructed from the data provided by olistolites redeposited in a northern, presumably Dinantian receptacle. Such a succession is paleontologically documented from Famennian II up to Famennian V (and VI ?). It shows a condensed character and displays faunal affinities with the Upper Devonian "Mediterranean realm" of the Montagne Noire and of the Pyrénées.

The erosive events which caused the ablation of part of the Lower Paleozoic sequence (e.g. Laval and Cotentin area) are intimately related to the Bretonic emersion. This more or less prominent glyptogenic process took place before the deposition of topmost Famennian or early Tournaisian continental or deltaic deposits.

In conclusion the Bretonic movements during uppermost Devonian time can be regarded as an important event of the Paleozoic geologic evolution of the Armorican Massif, at least from a sedimentologic point of view.

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