

FAMENNIAN REGRESSION AND STRUNIAN GRABENS IN THE ARMORICAN MASSIF. A KEY-AREA : WESTERN BRITTANY

by

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(3 figures)

ABSTRACT. - An updated lithologic and paleontologic analysis of the most important Upper Devonian and Lower Carboniferous sections in the western part of the Armorican Massif is presented and compared with the data from the eastern part of the same Massif. It helps to understand the tectono-sedimentary processes around the Devonian-Carboniferous boundary and provide the basis for a paleogeographic interpretation. (Abstracted by the editors).

RESUME. - Une mise à jour des données lithologiques et paléontologiques des plus importantes coupes du Dévonien supérieur et du Carbonifère inférieur de la partie occidentale du Massif Armoricain est présentée et comparées aux données de la partie orientale du même massif. Elle aide à comprendre les processus tectono-sédimentaires près de la limite Dévonien-Carbonifère et fournit les bases d'une interprétation paléogéographique.

1. - INTRODUCTION

The western part of the Armorican Massif (Western France) is an excellent region for the study of Famennian sediments and their relationships with those of the Strunian and Dinantian. Three areas are discussed here : Morlaix, Châteaulin and Rade de Brest. The terms "Châteaulin Basin" and "Morlaix Basin" are used here in the more restrictive acceptation i.e. for the Dinantian period only.

The Rade de Brest in the western Châteaulin Synclinorium yields the most complete Devonian sections of the Armorican Massif. These consist of marine, apparently continuous, autochthonous sequences. They are well-dated by macrofauna and microfauna and range from the lowermost Gedinnian to the lower part of the Upper Famennian (Fa2a). The Devonian of Morlaix is very incomplete and/or poorly dated.

Paleontologically dated Strunian (Tn1a) deposits only occur in the western part of the central Armorican Massif (on the northeastern flank of the Châteaulin Basin and in the Morlaix Basin). These consist of subaquaceous, autochthonous sediments with olistolites and/or pebbles, but without evidence of a marine environment.

Distinctly marine, autochthonous Dinantian rocks occur in the western part of the Châteaulin Basin. These lower Tn3c Quivit Limestones represent the south-westernmost extension of the Northern-European Dinantian sea.

2. - COMPARISON WITH EASTERN PART OF THE ARMORICAN MASSIF

A rather different succession is known from Ménez Bélaïr in the eastern part of the Armorican Massif, where the marine Devonian sequence only ranges into the Lower Famennian (Fa1a), where the Strunian deposits are unknown, and where the marine Dinantian Quenon Limestone is of latest Tournaisian (Upper Tn3c) age (Paris *et al.*, 1982). The eastern part

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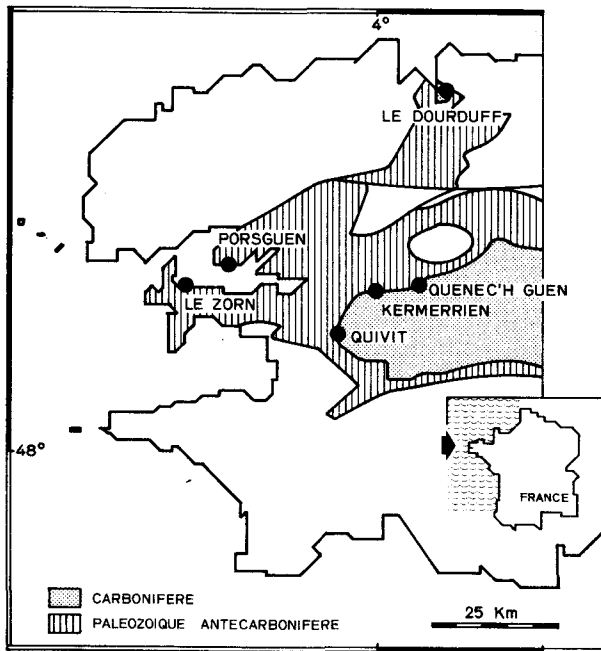


Figure 1. - Location map.

of the Armorican Massif is also distinguished from the western area by the following aspects :

- vast areas without Devonian or Carboniferous sediments on top of the Lower Paleozoic rocks (Mancellia synclines to the South of Rennes);
- structural units with marine, autochthonous and continuous Devonian successions which are however not younger than Emsian (Cotentin, Laval Synclinorium; Houlgatte *et al.*, in press);
- relatively complete marine Devonian sequences (Gedinnian to Famennian), but mainly recognized as olistolites in the Dinantian deposits (Angers, St. Julien de Vouvantes, Ancenis; Dubreuil, 1980, 1985);
- isolated occurrences of precisely dated (autochthonous or allochthonous ?) Givetian Ville-dé-d'Ardin Limestones (Vendée);
- reddish autochthonous deposits (Hyenville, Cotentin) of presumed Upper Mesodevonian to Neodevonian age (Doubinger & Poncet, 1964);
- the already mentioned absence of Strunian sediments.

It should be noticed that there is no biostratigraphic evidence supporting the hypothesis of Poncet & Giresse (1972) that the Robillard Sandstone is of Upper Devonian or Tournaisian age. This idea is based on the fact that this sandstone occurs in between the Hyenville deposits of presumed Upper Mesodevonian to Neodevonian age and the Upper Tournaisian to Visean (Pelhâte & Poncet, 1970; Pelhâte, personal communication) Montmartin Limestones. Further-

more, since the age of the Hyenville deposits is questionable, there is no means for dating the lower limit of the Robillard Sandstone. This implies that there is a reasonable doubt about the existence of Strunian rocks in Normandy.

This brief review of the deposits around the Devonian-Carboniferous boundary shows that the most precisely dated sediments occur in the western part of the Armorican Massif. Moreover, a major structural event affected that area during the Famennian-Strunian period. Rocks showing the impact of the Bretonic phase (syncleavage folding, overthrusting, syntectonic magmatism and granitisations; Darboux *et al.*, 1977; Rolet, 1982) are unconformably overlain and reworked by the Strunian synchro-recumbent nappes of the Châteaulin (pull-apart) Graben (Rolet & Thonon, 1979; Guillocheau & Rolet, 1982; Rolet, 1984).

3. - KEY-SECTIONS IN WESTERN BRITTANY

An updated lithologic and paleontologic analysis of the most important sections is presented here. These serve as a basis for paleogeographic reconstructions.

3.1. - WESTERN CHATEAULIN SYNCLINORIUM

Two sections are considered : the Porsguen section of the Rade de Brest and the Zorn section of the Crozon Peninsula.

The Upper Frasnian and Famennian are represented by the Porsguen and Zorn formations which form the top of an important sequence of marine shelf deposits ranging from the Pridoli into the Famennian. The Upper Frasnian to Lower Famennian (do1δ - do11α) Porsguen Formation (thickness some 50 m ?) consists of black (kerabituinous) shales with abundant fossiliferous nodules and without any detrital influx. Large calcareous spheroids and/or some carbonate layers occur in the lower portion, whereas silico-pyritic nodules are found in the upper half (Babin *et al.*, 1976, Morzadec, 1983). At Porsguen these nodules have yielded diverse fossil assemblages including bivalves (*Posidonia venusta*, *Buchiola retrostriata*), goniatites (*Cheiloceras circumflexum*, *C. verneuili*) and floated plant debris (*Protolepidodendropsis pulchra*, *P. frickeii*, *Lepidodendropsis africanum*, *Leptophloeum rhombicum*, *Platyphyllum brownianum*). The reducing character of these sediments suggests a confined marine environment, probably near emerged areas and very shallow (Babin & Plusquellec, 1965). This period is marked by "un paysage à topographie molle où se trouvent délimitées des aires de sédimentation de petite taille, euxiniques, qui communiquent entre elles. Les reliefs ont disparu". (Guillocheau, 1982). Although there are no hard facts proving the shallow environment, the analogy with the black, reducing sediments of the

Armorican Silurian (Guillocheau, 1982) supports this hypothesis. And thus, in our opinion the Porsguen Formation marks the beginning of the latest Devonian regression.

The Upper Famennian (transitional zone doll-doll, or Fa2a) Zorn Formation has a thickness of some 25–30 m. It is only known from two locations: Porsguen (Rade de Brest) and Le Zorn (Crozon Peninsula). It consists of essentially shales and alternating shales and limestones with some syndepositional slumpings. This formation forms the youngest pre-Carboniferous marine deposit in the central Armorican Massif (Babin *et al.*, 1976; Morzadec & Babin, 1976) and it is characterized by the occurrence of reworked spores (Morzadec & Streel, 1980) indicating that the sedimentary succession has been deeply truncated, sometimes even into the Emsian rocks (i.e. down to 850 m!). This erosion is a result of (non-folding) deformations linked to the early Bretonic movements of the Hercynian orogeny.

3.2. - WESTERN BORDER OF CHATEAULIN BASIN

The Quivit section is situated in an isolated micro-graben near the southwestern border of the present-day Châteaulin Basin. The outcrops exhibit the Lower Tn3c (*anchoralis* to *latus* conodont zones) Quivit Limestone (Plusquellec *et al.*, 1983). This shelf limestone forms the oldest deposit of the marine Dinantian in the Châteaulin Basin. Probably, it disconformably overlies (at least according to cartographical mapping) marine Devonian (Givetian or possibly Frasnian) strata. The Lower Frasnian Traonlions Shales have been observed a few hundreds of meters to the South-East. But the Porsguen and Zorn Formations are absent along the entire border of the Châteaulin Basin. The Quivit Limestone is overlain by the Caouennet Conglomerate (including reworked Upper Visean Limestone pebbles) and the Pont-de-Buis shales and wackes of Upper Visean (V3b–V3c) to Namurian age. The detrital material in the latter may have been deposited by presumably shallow prodeltaic turbidites (Guillocheau & Rolet, 1982). The marine facies of the Pont-de-Buis strata may only be deduced from the occurrence of calcareous lenses (V3b) which might have been reworked within the same area where these were formed.

3.3. - NORTHERN BORDER OF CHATEAULIN BASIN

3.3.1. - Kermerrien section

The Kermerrien Formation was originally described in its type locality (Rolet & Thonon, 1979; Guillocheau & Rolet, 1983), which outcrops along the ancient road from Brasparts to Pleyben (road D785) completed with sections along the paths around Kermerrien. A recent trench for a road between Kermerrien and the Coatiliou farm has yielded complementary information in 1984.

The lowermost strata of this formation occur at the foot of the northern slope of the Kermerrien hill.

These consist of black shales with thin laminae of rhythmic sandstones (striped shales). In some levels the sandstones predominate (varved sandstones) and sometimes these may become tuffitic (cherty tuffites). Normally however, they contain reworked volcanogenic material. These sediments enclose olistolites of varying dimensions and consisting of Siluro-Devonian material (Rolet, 1982). They also enclose chaotic shale masses with pebbles and blocks of quartzite and acid tuffs which represent typical olistolites (along the new road to Brasparts and in the section of Toulanay to the South of St. Herbot).

The gravelitic shales at Kermerrien which occur West of a plurimetric olistolite of black stratified quartzite (probably of Upper Silurian age) have yielded palynologic assemblages with acritarchs (*Gorgonisphaeridium absitum*, *G. ohioense*, *Elektoriskos dofos*, *Acriora* sp., *Veryhachium roscidum* and *Daillydium quadridactyles*; det. Deunff) and spores (*Retispora lepidophyta*, *Vallatisporites pusillites*, *Verrucosiporites nitidus*, *Dictyotriletes* sp. and numerous leiospheres; det. Streel). These point to an Upper Strunian age and do not contain any reworked elements.

This formation is overlain by acid tuffs, the contact being either a fault (new road section) or a wash-out with reworked Strunian shales (Toulanay section and express road of Vieux Tronc to the South of Huelgoat). In the latter case, these acid tuffs belong to the Kertanguy Formation which has not been dated but which is assigned to the Tournaisian.

The base of the Kermerrien Formation is not exposed in the Kermerrien section, but can be observed at Toulanay. It consists of a vertical fault with dextral sliding putting into contact the Strunian (striped) shales with Lower to Middle Devonian Brasparts shales enclosing several dykes. It should be noticed that the complete extension of the Kermerrien Formation has not been observed in any of these sections, and also that the Upper Devonian strata known from the Rade de Brest seem to be absent on the present-day borders of the Châteaulin Basin.

3.3.2. - Quenec'h Guen section

This section is located to the East of the Kermerrien section along a North-South path which descends to the Ellez River. It is situated on the northern border of the Châteaulin Basin (South of Huelgoat, West of Plouyé). The some 600 m long section exhibits in its lower part clastic Devonian deposits (Lower Emsian to Eifelian) which disconformably overly Siluro-Devonian formations (Rolet & Thonon, 1979). The Devonian deposits exhibit gravitational slumpings (Deunff *et al.*, 1984) and thus a reworking of fossil faunas and microfloras cannot be excluded.

The upper part of the section (level 11, section E in Deunff *et al.*, 1984) consists of shales with rare nodules and decalcified layers. These have not yielded any identifiable fossil. They are overlain by an apha-

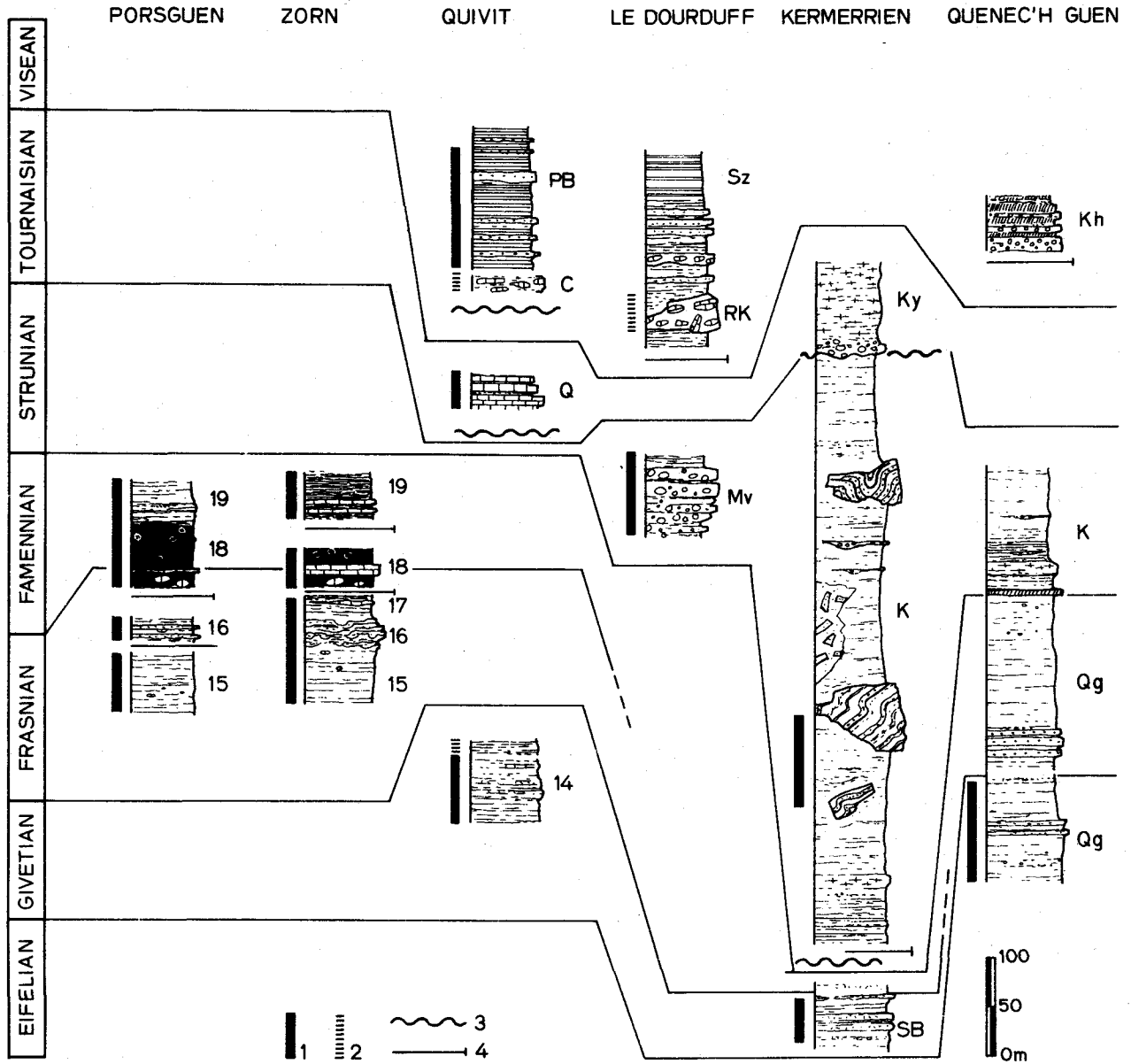


Figure 2. - Lithostratigraphical columns of the late Devonian and Dinantian in the western part of the Armorican Massif.

Nomenclature of the formations (14-19 after Morzadec's numbering, 1983).

14. Unnamed formation equivalent to the Kergarvan limestone; 15. Traonlors shales; 16. Goasquellou sandstone; 17. Rostiviec shales and limestones; 18. Porsguen shales; 19. Zorn shales; Q. Quivit limestone; C. Caouennet Conglomerate; P.B. Pont-de-Buis shales and wackes; Mv. Melin Vor Conglomerate; RK. Rocher Kerivoalen breccia; SZ. Morlaix shales; SB. Unnamed formation in the Brasparts sector; K. Kermerrien shales with olistolites; Ky. Kertanguy tuffs; Qg. Quenec'h conglomerates and lavas; 1. Level paleontologically dated; 2. Level imprecisely dated; 3. Disconformity; 4. Fault.

Note added in proof : we were unaware of the paper by Perroud H., Robardet, M., Van de Voo, R., Bonhommet, M. & Paris, F. Revision of the age of magnetization of the Montmartin red beds, Normandy, France. *Geophys. J. R. astr. Soc.* (1984) 80 : 541-549.

In this paper the authors say that no microfossils have been found in the Hyenville Formation and that "it appears to be preferred to consider the Hyenville Formation as undated at best, and in all likelihood to be older than Devonian".

nitic lava flow (bed 13) and shaly tuffites with quartzitic pebbles (bed 15). These volcanics might represent the lower strata of the Kermerrien Formation, here overlying the presumably Devonian shales of level II without any apparent unconformity or fault. The overlying sequence closely resembles that of the Kermerrien section and consists of alternating shales and black quartzites overlain by striped shales. Some crinoid fragments and unidentifiable plant remains have been found in the tuffitic beds in these shales which have been attributed to the Strunian Kermerrien Formation because of their similar facies and cartographic lateral continuity with the same. These can be followed over a distance of some 100 m to the South where the section is interrupted by the Ellez River. At the other side of the river they appear again with a very tuffitic facies. There, these are overlain by the conglomerates of the Kerroch Formation. Although this section is incomplete and poorly dated, it is of interest because it shows that the rocks attributed to the Strunian rest upon a chaotic sequence (Quenec'h Guen shales and sandstones) of at least Eifelian age which was deposited here by gravitational sliding somewhere between the Eifelian and Strunian.

3.4. - MORLAIX BASIN

The Morlaix Basin is a structural unit of its own (Cabanis *et al.*, 1979), bordered by volcanoclastic sandstones which are related to or pass into a breccia (Dourduff Breccia) to the North-East and which are overlain by the Morlaix striped shales.

The intense tectonisation of the Morlaix Basin and also the scarce data about the stratigraphic age of the formations make it rather difficult to compare the same with those of the other Dinantian basins. The actual information (Rolet *et al.*, 1984) allows the distinction of two formations within the Dourduff Breccia, the Melin Vor Formation and the Kerivoalen Formation.

3.4.1. - Melin Vor Formation (new formation)

This formation outcrops in ancient quarries South of the bridge of Melin Vor on the southern bank of the Dourduff River. It is a very heterogranular conglomerate without any graded-bedding, consisting of pebbles of sandstones, quartzite, shale and keratophytic tuffs enclosed in a shaly matrix. This matrix, and the shaly intercalations and black shales occurring to the North of the quarries have yielded a rich microflora (numerous spores and scarce acritarchs) and scolecodonts (Deunff & Coquel, 1979). These assemblages correspond to the top of the *Wocklumeria-Kalloclymenia* beds (to VI) of the Tn1a or to the lowermost Tn1b equivalent of the Strunian in Belgium. The homogeneity of the assemblages collected from different samples seems to exclude the hypothesis that these might have been reworked. Thus, these strata are the oldest ones known in the Morlaix Basin.

3.4.2. - Kerivoalen Formation (new formation)

The formation occurs on the northern banks of the Dourduff River between Dourduff-en-Mer and Dourduff-en-Terre, and it outcrops along the river in a cliff where limestones have been quarried. Geometrically, this formation overlies the Melin Vor Formation. It is distinguished by the nature, shape and size of its elements and also by the nature of the matrix. This formation exhibits all the characteristics of a gravitational subaqueous olistostrome. The occurrence of limestone blocks with unidentifiable crinoid remains had been observed already a long time ago. Recently these blocks have yielded some conodont fragments similar to *Gnathodus* ex group *pseudosemiglaber* (det. Weyant) which ranges from the Upper Tournaisian (Tn3) to the Lower Visean (V1a). Other samples had yielded algae, among which *Koninckopora inflata* which is also known from the Middle Visean (V2a) in Belgium (Pelhâte, 1973).

One might accept that the reworking of these limestone blocks from the Northern-European Dinantian carbonate shelf occurred during the Middle or Upper Visean, i.e. during the same period as the reworking of the calcareous lenses of V3b age in the Pont-de-Buis strata of the western Châteaulin Basin. Also the Morlaix striped shales which geometrically occur on top of the Kerivoalen Breccia might be of Visean age.

The basal strata of the Morlaix Basin are cartographically represented by shales and greywackes of the Berlingar Formation, which has been assigned (without paleontological evidence!) to the Upper Devonian (Cabanis, 1972; Morlaix map 1:50,000, 1981). However, the petrographic characteristics of this formation suggest a correlation with the tuffitic sandstones associated with the Kerivoalen Breccia. If this suggestion is correct, the Morlaix Basin would be a Visean basin (Middle or Upper Visean) resting discordantly upon a small Strunian outlier (Melin Vor Conglomerate) in the Dourduff River and overlying to the South of Morlaix the chloritoid shales (or black shales) of the Lower Devonian.

4. - PALEO GEOGRAPHIC AND GEODYNAMIC INTERPRETATION

The foregoing data help us understand the tectono-sedimentary processes around the Devonian-Carboniferous boundary in the western part of the Armorican Massif. At the same time these provide the basis for a paleogeographic interpretation (fig. 3). The Bretonic phase is only marked by a simple upward of the eastern area since the Middle Devonian, but it has its complete significance in the western part where the first movements are recorded by the reworked spores in the Zorn Formation and culminate in the Upper Famennian regression. Subsequently, all the Paleozoic deposits (including the Famennian II-III) have

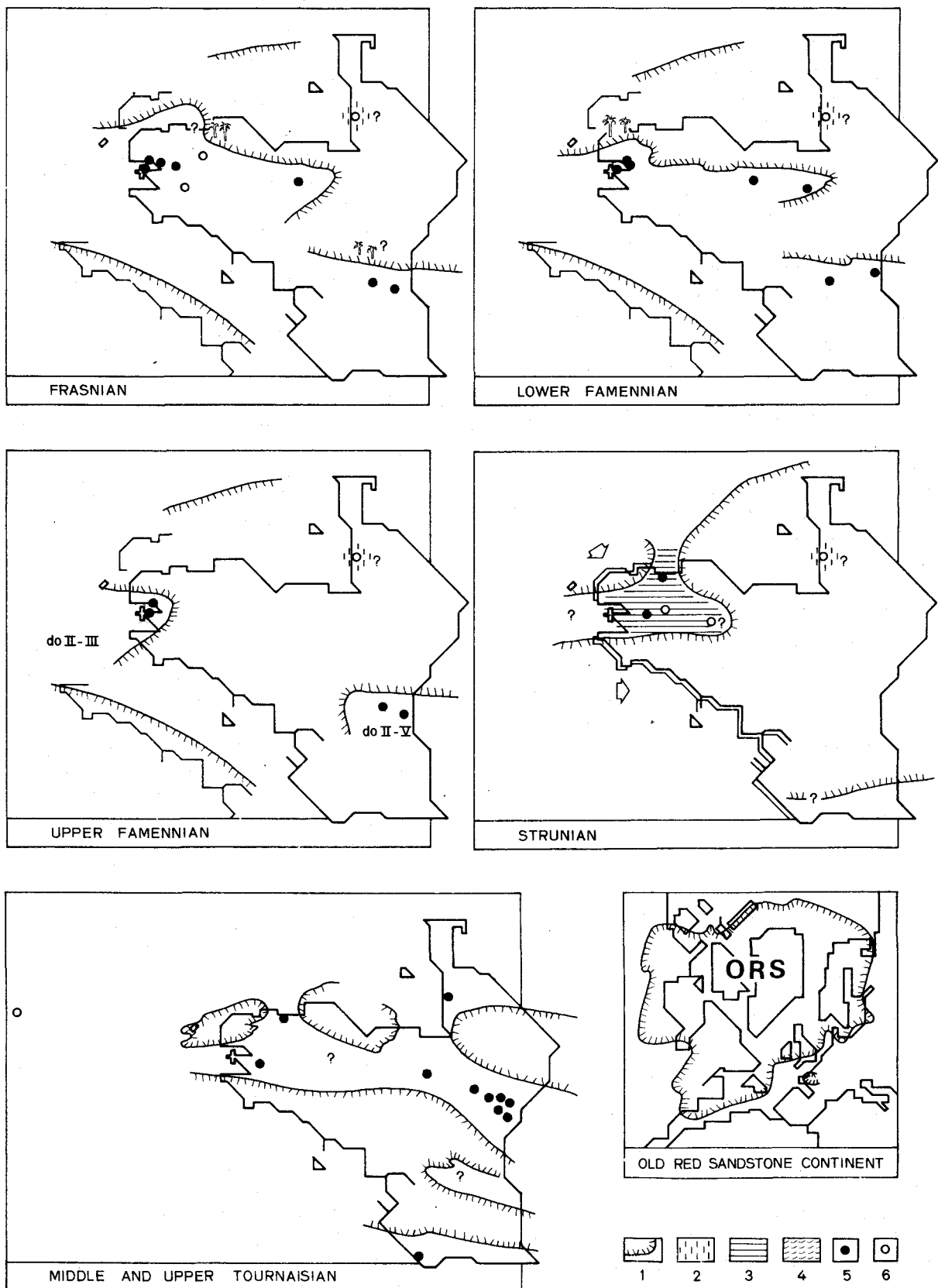


Figure 3. - Paleogeographic maps of the Armorican Massif for the Frasnian to Tournaisian and hypothetical position of this area with regard to the O.R.S. continent.

- 1. Emerged area or without deposits; 2. Continental facies; 3. Lacustrine (?) area with marine effect; 4. Marine;
- 5. Locality with a controlled age (micro- or macrofossils); 6. Possible or questionable age.

(For the map "Middle and Upper Tournaisian", the reference of the locality situated on the flank of the shelf is Auffret *et al.*, 1979).

been affected by the Bretonic tectonics during a very short time interval (Famennian II-III to Strunian). As a result of these movements in the West some areas of clastic deposition (with blocks) developed since the Strunian. These formed the centers of the tectono-sedimentary basins which acquired their full extension during the widely extended Dinantian transgression.

REFERENCES

- BABIN, C. & PLUSQUELLEC, Y., 1965. Sur la profondeur des mers dévoniennes dans l'Ouest du Finistère. Bull. Soc. géol. minéral. Bretagne (1962-1963) N.S. : 1-8.
- BABIN, C., CAVET, P., LARDEUX, H., MORZADEC, P., PARIS, F., PONCET, J. & RACHEBOEUF, P., 1972. Le Dévonien du Massif Armoricaïn. Bull. Soc. géol. Fr. 7, 14 : 94-109.
- BABIN C., GOUJET, D., LARDEUX, H., LEJAL-NICOL, A., LETHIERS, F., MORZADEC, P., PLUSQUELLEC, Y., & WEYANT, M., 1976. La Formation des Schistes de Porsguen (Dévonien supérieur de la Rade de Brest, Massif Armoricaïn) lithologie, flore, faune. Ann. Soc. géol. Nord, 1976, 96 : 333-346.
- CABANIS, B., 1972. Sur l'attribution au Dinantien des formations de Morlaix (Finistère Nord). C.R. Acad. Sc., Paris, 174, D : 2129-2132.
- CABANIS, B., CHANTRAINE, J. & HERROUIN, Y., 1979. Le bassin de Morlaix, unité circonscrite et indépendante dans le contexte géologique régional. Bull. B.R.G.M., 2, 1, 4 : 269-276, 2 fig.
- COQUEL, R. & DEUNFF, J., 1977. Sur la découverte de spores du passage Dévonien-Carbonifère (Strunien), dans le complexe schisteux de la "Brèche du Dourduff" (région de Morlaix, Finistère) et sa signification. C.R. Acad. Sc. Paris, 285, D : 15-18, 1 pl.
- DARBOUX, J.R., GRAVELLE, M., PELHATE, A. & ROLET, J., 1977. L'évolution tectonique de la terminaison occidentale du domaine centre armoricaïn au Dévonien et au Carbonifère. C.R. Acad. Sc., Paris, 284, D : 1151-1154.
- DEUNFF, J., GUILLOCHEAU, F. & ROLET, J., 1984. La coupe de Quenec'h Guen (Centre-Finistère) : unité dévoniennne originale ? ou complexe glissé à la base du Bassin carbonifère de Châteaulin ? Résumé Comm. Le Mans 1-2 oct. 1984. RCP 705. Géodyn. Massif Armoricaïn.
- DOUBINGER, F. & PONCET, J., 1964. Découverte de micro-organismes dans la série rouge de Montmartin (Manche). Attribution de cette série au Dévonien moyen ou supérieur. C.R. Acad. Sc. Paris, 258, D : 1004-1006.
- DUBREUIL, M., 1980. Hypothèse sur la mise en place, au Dinantien, du complexe du Tombeau Leclerc (Bassin d'Anckenis, sud-est du Massif Armoricaïn) sous forme d'un olistostrome. Conséquences géodynamiques. C.R. Acad. Sc., Paris, 290, D : 1455-1458.
- DUBREUIL, M., 1985. Le bassin paléozoïque de St Julien-de-Vouvantes - Angers (Sud-est du Massif Armoricaïn). Synclinal complexe ou bassin en contexte décrochant ? Résumé comm. Séance sp. Soc. géol. Fr. "Genebass" Paris 30-31 mai 1985.
- GUILLOCHEAU, F. & ROLET, J., 1982-1983. La sédimentation paléozoïque ouest-armoricaïne. Histoire sédimentaire; relations tectonique - sédimentation. Bull. Soc. géol. minéral. Bretagne, (C), 14, 2 : 45-62.
- HOULGATTE, E., LE HERISSE, A., PELHATE, A. & ROLET, J., (in press). Evolution géodynamique du Bassin carbonifère de Laval (Massif Armoricaïn).
- MORZADEC, P. & BABIN, C., 1976. Présence de *Trimeroccephalus caecus* (Gurich, 1896) (Trilobita, Phacopidae) dans le Famennien inférieur du Finistère : Intérêt stratigraphique et paléogéographique. Geobios, Lyon, 9, 3 : 367-371.
- MORZADEC, P. & STREEL, M., 1980. Remaniement de spores dévoniennes dans le Famennien de la rade de Brest (France). Géobios, Lyon, 13, 1 : 115-119.
- MORZADEC, P., 1983. Le Dévonien (Emsien-Famennien) de la rade de Brest (Massif Armoricaïn). Lithologie, cartographie, stratigraphie, paléogéographie. Bull. B.R.G.M., (2), n° 4 : 269-310, 25 figs.
- PARIS, F., LE HERISSE, A., PELHATE, A. & WEYANT, M., 1982-1983. Les formations carbonifères et la phase bretonne dans le synclinorium du Menez Bel Air. Essai de synthèse. Bull. Soc. géol. minéral. Bretagne, (C), 14 : 19-23, 2 pl.
- PELHATE, A. & PONCET, J., 1970. Précisions sur l'âge de la partie basale du Dinantien du "Synclinal" de Montmartin (Manche). C. R. somm. Soc. géol. Fr., 4 : 109.
- PELHATE, A., 1973. A propos de la microfaune dinantienne des calcaires du Dourduff (Nord-Finistère, France). C. R. somm. Soc. géol. Fr. : 129-131.
- PLUSQUELLEC, Y., PELHATE, A., ROLET, J. & WEYANT, M., 1982-1983. Découverte de calcaire tournaïen supérieur et de conglomérats (Viséen supérieur probable) près de la bordure occidentale du Bassin de Châteaulin (Massif Armoricaïn, France). Intérêt stratigraphique et tectonique. Bull. Soc. géol. minéral. Bretagne, (C), 14, 2 : 1-17, 3 pl.
- PONCET, J. & GIRESE, P., 1972. Nouvelle datation des niveaux gréseux entre Hyenville et Cerisy-la-Salle. Synclinal de Montmartin-sur-Mer (Manche). Bull. B.R.G.M., (2), 1 : 49-58, 2 figs.
- ROLET, J. & THONON, P., 1979. Mise en évidence de trois complexes volcano-détritiques d'âge dévonien inférieur à moyen, strunien et viséen inférieur sur la bordure nord du bassin de Châteaulin (feuille Huelgoat 1/50.000, Finistère). Implications paléogéographiques et tectoniques. Bull. B.R.G.M. (2), 1, 4 : 303-315, 8 figs.
- ROLET, J., 1982. Présence d'olistolites de toutes tailles dans la Formation de Kermerrien (Strunien), manifestation tardive de l'activité orogénique bretonne (bordure septentrionale du Bassin de Châteaulin, région du Huelgoat - Finistère). 107e Congr. nat. Soc. sav., Brest, Sciences, fasc. II : 59-69.
- ROLET, J., 1983-1984. Graben losangiques (pull-apart) en régime de décrochement. Le rôle des coulissements hercyniens dans l'individualisation des bassins carbonifères du Massif Armoricaïn. Ann. Soc. Géol. Nord, CIII : 209-220.
- ROLET, J., THONON, P., DEUNFF, J. & PELHATE, A., 1984. Mode de mise en place et signification dynamique de la Brèche du Dourduff (Finistère). Résumé. Comm. Le Mans 1-2 oct. 1984, RCP 705 Géodynamique du Massif Armoricaïn.