## I. INTRODUCTION

*by P. SARTENAER*

When it was established in Marburg on December 10, 1973 the International Subcommission on Devonian Stratigraphy, (SDS) decided that its first task was to propose clear definitions and boundaries for the Devonian Series and Stages. This was the wish expressed by the 24th International Geological Congress (Montréal, 1972) in answer to the growing dissatisfaction of a great part of the geological community with the undependability of some of the classical stratigraphic subdivisions. It was implied that the work of the SDS should lead to an internationally accepted language and to increasing stability.

Unfortunately no time limit was set up, and of twelve necessary decisions (two Series boundaries, four Stage boundaries, six Stratotypes, now called Global Stratotypes), after fourteen years only five have been reached (*see* Table). Since July 24, 1981 the SDS also accepted the designation of Parastratotypes, now called Auxiliary Stratotypes, increasing by six the number of decisions to be made ; two of them, including the one discussed in this paper, have been reached.

Belgium was concerned to the highest degree. It is the reference region altogether of four of the seven Stages of the Devonian System, and of the lowest Stage of the immediately overlying Carboniferous System.

The conditions prevailing at the time of the early 19th Century industrial revolution in Western Europe, as well as the pioneer work of several outstanding geologists and palaeontologists, have rendered classical an area of 375 km2 extending in Belgium and France along the southern border of the Dinant Basin.

The village of Frasnes (1,300 inhabitants in 1983) is located 2.9 km north of the town of Couvin (5,000 inhabitants in 1983) on the Eau Noire, which immediately (6 km) adjoins the Massif de Rocroi, where the village of Gedinne (4,200 inhabitants in 1983) lies. The village of Frasnes is at a distance of 24 km southwest of the town of Givet (7,800 inhabitants in 1983) on the river Meuse and is centrally located within the Fagne-Famenne natural region. The latter extends from Fourmies (France) to Louveigné (Belgium) ; the name Fagne applies to that part of the region west of the river Meuse, and the name Famenne to that portion east of the river.

The localities of Couvin, Frasnes, Gedinne, Givet and the Fagne-Famenne region have given their names to :

1828 - Calcaire de Givet (J.J. d'OMALIUS d'HALLOY, p. 162)
1839 - Schistes de Famenne et Fagne (J.J. d'OMALIUS d'HALLOY, p. 448)
1848 - Gedinnien (A.H. DUMONT, p.4)
1853 - Schistes de Famenne (J.J. d'OMALIUS d'HALLOY, p. 300)
1855 - Famennien (A.H. Dumont, map)
1862 - Calcaire de Couvin (J.J. d'OMALIUS d'HALLOY, p. 512)
1862 - Calcaire de Frasne (J.J. d'OMALIUS d'HALLOY, p. 513)
1868 - Schistes de Gedinne (J. GOSSELET and C. MALAISE, p. 65)
1879 - Frasnien (J. GOSSELET, p. 130, p. 133)
1879 - Givetien (J. GOSSELET, p. 130, p. 132)
1885 - Couvinien (E. DUPONT, map 1:20,000)

It is not only these stages and their limits which are classical, but also their subdivisions, which proved very stable, in the sense that they have widely been used. Until the World War I, our predecessors intentionally gave to the units they established definitions that incorporated both lithological and paleontological criteria (*see* P. SARTENAER, 1973, p. 2, 1974a, pp. 4-6, 1974b, p. 2, 1974d, p. 7, 1977, p. 73). Progressively, however, new definitions came to be introduced, while the same terminology was still maintained; these were based, according to the respective author's bias, sometimes on one or other of the lithological characters, sometimes on one or other of the paleontological attributes (even wrongly identified fossils !). This self-sustained resultant confusion and equivocation were strongly deplored (*see* P. SARTENAER and M. ERRERA *in* M. ERRERA, B. MAMET and P. SARTENAER, 1972, p. 22, explanation of fig. 2, p. 34, P. SARTENAER, 1974a, 1974b, 1974c, 1974d, 1977, p. 69, p. 73) standing as they do in striking and unflattering contrast to the rigour of present-day scientific discussions. Fortunately, the confusion is gradually dying out and meaningful definitions of lithostratigraphic units, completely independent of their faunal contents and their extension in time, are progressively being introduced.

It must also be recalled that, in classical areas, the initial and major palaeontological investigations of the last century were distinctly oriented towards brachiopods : e.g., J. HALL in New York State, J. BARRANDE in Bohemia, E. de VERNEUIL in the Ural Mountains J. GOSSELET in France and Belgium, L.-G. de KONINCK in Belgium, etc... This historical tradition undoubtedly represented an invaluable contribution, but it is also clear that a considerable time elapsed before any scientist dared to challenge one or another of these "monuments". Thus, the initial advantage ultimately became a heavy burden and a strong handicap for further research. Of course, excellent studies on brachiopods have been made in the first half of this century (e.g., by E. MAILLIEUX in that part of the world concerning us in this paper) ; but newly oriented investigations on brachiopods have undoubtedly coincided with the burgeoning of conodont studies. One of the side effects of the increasing stratigraphic refinements attained by conodont investigations has been to encourage specialists in other groups to apply new methods in order to obtain comparable biostratigraphic results. Amongst the brachiopods, rhynchonellids have already emerged as an outstanding tool for stratigraphy ; atrypids, spiri-

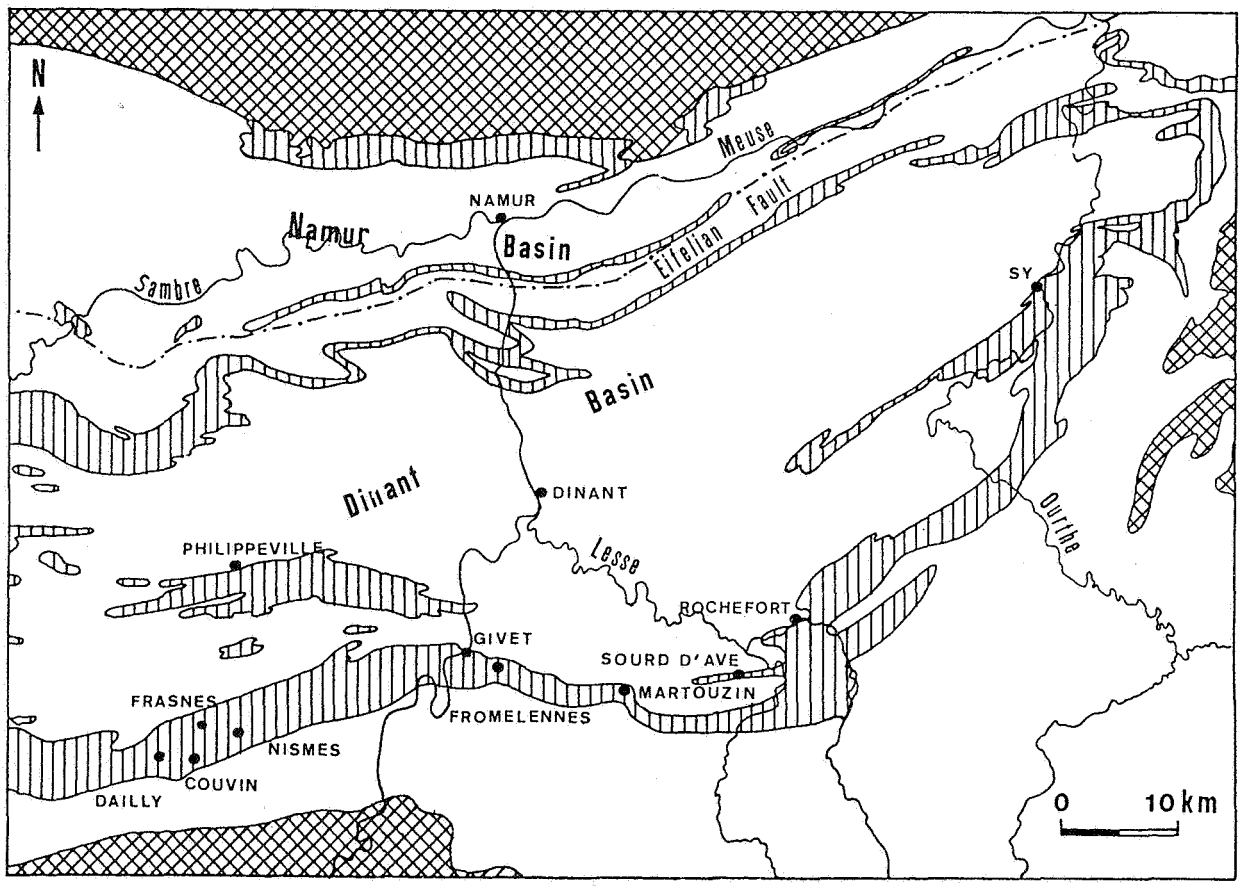
ferids, and athyrids are following this lead.

It has always been impossible to determine palaeontologically, and in any other way, the base of the Gedinnian. This led the Committee on the Silurian-Devonian Boundary on August 23, 1972 in Montréal (Canada) to choose Klonk (Czechoslovakia) as the locality for the Stratotype of the Silurian-Devonian boundary. On the other hand, the Gedinnian contains only a restricted number of strata with fauna and flora, ant the stratigraphic ranges of the various taxa represented is too long for having any significance in fine correlation. Therefore, on September 23, 1983, in Montpellier (France), W.A. Oliver, Jr., seconded by the author, moved that the Gedinnian be relinquished. This proposal was unanimously adopted ; for similar reasons the Siegenian of Germany underwent the same fate.

On September 19, 1979 in Sigüenza (Spain), the SDS designated the base of the *Polygnathus costatus partitus* Zone, introduced the same year for the first time in the literature, as the Lower-Middle Devonian boundary. As a corollary, preference was given to the Eifelian versus the Couvinian. This is not a new debate and the author mus recall that, by an irony of fate, the term Eifelian was first proposed in 1848 by the Belgian geologist, A. DUMONT. It would be contrary to the truth to write that this decision was well-advised. There is no general agreement among conodont specialists about the validity, and thus the recognition of *P. costatus partitus*. It also has a sporadic distribution : outside the Eifelian Hills and Bohemia, there are vast territories, such as the USSR, southern China, western North America where it cannot be definitely considered that the "subspecies" has been "found". On July 22, 1981, in Binghamton (New York, USA), Wetteldorf (Germany) and Prastâv (Czechoslovakia) were selected, respectively, as Global and Auxiliary Stratotypes of the Lower-Middle Devonian boundary.

A succession of important decisions took place between 1981 and 1983.

Following a motion moved by W.A. OLIVER, Jr., seconded by the author, the titular members of the SDS voted on July 22, 1981, in Binghamton, in favour of retaining the names Givetian, Frasnian and Famennian. W.A. OLIVER, Jr, on August 22, 1982 in Frankfurt-am-Main (Germany), and W. ZIEGLER, on September 23, 1983 in Montpellier, respectively, moved that the Givetian-Frasnian and the Frasnian-Famennian boundaries should correspond to the base of the Lower *Polygnathus asymmetricus* Zone, and to the base of the Middle *Palmatolepis triangularis* Zone ; in both cases, the author seconded the motion. These boundaries almost coincide with the historical boundaries. Even though our knowledge may not have reached the desired level of completeness, and in spite of our accumulating world-wide knowledge of Frasnian and Givetian, the choice of their limits and of their subdivisions made in the last century was truly a fortunate one. The Col du Puech de la Suque (section E) in the Montagne Noire (France) was chosen on August 7, 1985, in Bristol (Great Britain), as the Global Stratotype for the Givetian-Frasnian boundary. The Nismes (Belgium) outcrop, the importance of which is underlined in the following pages, was first suggested as an Auxiliary Stratotype




Locality map.

in Frankfurt-am-Main on August 22, 1982, then again in Montpellier on September 23, 1983 and in Bristol on August 7, 1985 ; it finally was adopted in Prague (Czechoslovakia) on August 8, 1986, P. BULTYNCK moving and I. CHLUPAC seconding.

Neither a global nor an Auxiliary Stratotype for the Frasnian-Famennian boundary has been selected as yet, although various suggestions have been submitted in Bristol on August 7, 1985 and in Prague on August 8, 1986 : Belgium (Hony railroad cut), Hérault (France), Kellerwald (Germany), Nevada (USA), New York (USA), Tafilalt (Morocco).

The Working Group on the Devonian-Carboniferous Boundary, established in 1976, recommended on May 17, 1979 in Washington (USA) the base of the *Siphonodella sulcata* Zone as the limit between the Devonian and Carboniferous Systems ( can we still speak of a Famennian-Tournaisian boundary ? ) There is still no definite agreement on this matter. The choice of a Global Stratotype also is still pending.

The various decisions made so far by the SDS are recorded on the following table.