

MIOSPORES IN MIDDLE—UPPER FRASNIAN TO FAMENNIAN SEDIMENTS PARTLY DATED BY CONODONTS (BOULONNAIS, FRANCE)

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ABSTRACT

Loboziak, S. and Streel, M., 1981. Miospores in Middle—Upper Frasnian to Famennian sediments partly dated by conodonts (Boulonnais, France). *Rev. Palaeobot. Palynol.*, 34: 49–66.

The middle—upper part of the Formation de Beaulieu exposed in the new railroad trench at Caffiers—Ferques and the Formation de Ferques exposed in the Tartinskal quarries contain well-preserved miospore assemblages. They are here restudied in comparison with new conodont data ranging from the middle *asymmetricus* to the *Ancyrognathus triangularis* Zone. The conodonts allow precise correlations with the type Frasnian area as well as with the Russian Platform and Timan—Pechora provinces. The miospore assemblages of the Formation d'Hydrequent are also considered and their age discussed in term of the Frasnian/Famennian boundary.

In the systematic part, two new combinations are proposed: *Ancyrospora lysii* (Taugourdeau-Lantz, 1960) nov. comb., and *Pustulatisporites rugulatus* (Taugourdeau-Lantz, 1967) nov. comb.

INTRODUCTION

An Upper Devonian rock sequence outcrops in the Boulonnais, between Calais and Boulogne in the northernmost area of France. This area belongs to a western extension of the Namur syncline which is mainly developed in Belgium.

Taugourdeau-Lantz (1960, 1967a, b and 1971) has described miospores from the succession of the Schistes de Beaulieu, Calcaire de Ferques and Schistes d'Hydrequent in the Boulonnais. Most of the investigated "Lower Frasnian" Schistes de Beaulieu were core-drill samples with no mention about their exact stratigraphical position regarding the base of these beds. The "Middle Frasnian" Calcaire de Ferques was studied by Taugourdeau-Lantz in the La Parisienne and Bois de Beaulieu (Beaulieu Nord) quarries, the "Upper Frasnian" in the Briqueterie de Beaulieu quarry. Her samples were noted in relation to an (unpublished) general section used by Magne (1964).

Recent works by D. Brice and collaborators, which have culminated in a formal definition of the lithological units of the Devonian of Ferques (Brice et al., 1979a), have also allowed better correlations within the Tartinskal quarries. Therefore most of these quarries as well as the upper part of the Ferques railroad section have been resampled for conodont and spore analysis. The lower part of the Formation de Beaulieu and the underlying Formation de Blacourt which has been well dated by conodonts (Bultynck in Brice et al., 1976, 1979b), was palynologically studied by us in this railroad section (Loboziak and Streel, 1980).

Productive spore samples are located on Fig. 1. Letters Q to S refer to lithological units in Brice et al. (1976), while letters VW, WY and Z refer to lithological units or intervals in Brice et al. (1977). The conodont results have been published by Coen (in Brice et al., 1981). They are shown on Fig. 1 with additional data from Magne (1964) and Bultynck (in Brice et al., 1979b). A few ostracod data of the Formation d'Hydrequent are taken from Lethiers (in Bonte et al., 1974).

SYSTEMATIC NOTES

Ancyrospora lysii (Taugourdeau-Lantz 1960) nov. comb. (Plate IV, 5).

Basionym: *Densosporites lysii* Taugourdeau-Lantz 1960, Rev. Micropaléontol. 3: 146, pl. 2, figs. 29–30, pl. 3, figs. 40–42.

Synonym: *D. lysii* Taugourdeau-Lantz 1960 in Taugourdeau-Lantz 1971, pl. IV, figs. 5, 7–9, 12–14.

There is a complete gradation from specimens with true bifurcated spines to nearly smooth specimens. The exine structures are otherwise similar to other *Ancyrospora*. Corroded specimens are comparable to forms assigned to *Pseudowilsonia naoumovae* by Taugourdeau-Lantz 1960 and later compared (Taugourdeau-Lantz, 1971) with the megaspore *Wybostisporites variabilis* Mortimer et Chaloner 1967.

Auroraspora sp. A. (Plate III, 6)

Synonym: *A. sp. cf. Diaphanospora perplexa* Balme et Hassell 1962 in Becker et al. 1974, pl. 21, figs. 12–14.

Cymbosporites sp. A (Plate I, 13–14)

Diameter: 45–55 μm .

Ornamentation of bifiform elements (1–2 μm high) consisting of rounded verrucae (1–2 μm wide) with a narrow tip (less than 1 μm high). The distribution of the ornaments entirely distal is typically irregular (2–8 μm apart).

Cymbosporites sp. B (Plate I, 15–16)

Diameter: 40–50 μm .

Ornamentation of coarse conical elements (2 μm wide and high) on the distal surface. The ornaments are evenly distributed (3–4 μm apart), denser at the equator.

Grandispora sp. A (Plate II, 16)

Diameter: 65–80 μm .

Intexine, thin, excentrically detached from the thick (3–4 μm) exoexine. Distal surface and equatorial region ornamented with prominent spinae, 6–12 μm high, tapering sharply. Ornaments evenly distributed with 30–40 elements prominent at equator. Suturæ accompanied by typical largely flexuous ray folds at the apex.

Pustulatisporites rugulatus (Taugourdeau-Lantz 1967) nov. comb. (Plate I, 3–4)

Basionym: *Polymorphisporites rugulatus* Taugourdeau-Lantz 1967, Rev. Micropaléontol. 10: 50, pl. 1, figs. 1–2.

Synonyms: *Polymorphisporites rugulatus* Taugourdeau-Lantz 1967 in Taugourdeau-Lantz 1971, pl. V, figs. 3, 5.

Reticulatisporites sp. in Taugourdeau-Lantz 1960, pl. 1, fig. 11.

We consider the equatorial darkening to be the result of the general exine thickness and not to correspond to a true cingulum.

Rugospora cf. *flexuosa* (Juschko) Streel in Becker et al. 1974 (Plate I, 11)
The typical convoluted ornaments of the species are not quite discernible on this material.

Samarisporites triangulatus Allen 1965 (Plate II, 1–5)

Synonyms: *Samarisporites euglypheus* Taugourdeau-Lantz 1967, pl. 2, figs. 7–8.
Samarisporites euglypheus Taugourdeau-Lantz 1967 in Taugourdeau-Lantz 1971, pl. VIII, figs. 4–5.

Samarisporites triangulatus Allen in Loboziak et Streel 1980, pl. II, figs. 11–12.

Samarisporites cf. *inusitatus* Allen in Taugourdeau-Lantz 1971, pl. VIII, fig. 7.

Samarisporites sp. aff. *S. inusitatus* Allen in Becker et al. 1974, enclosure II.

Compared to the material studied and illustrated in the Formation de Blacourt, there is a trend in the distal ornaments to fuse in a more or less reticulate pattern. A few specimens of the latter are encountered in the Formation de Beaulieu but they are dominant in the Formation of Ferques.

Samarisporites cf. *triangulatus* Allen 1965 (Plate II, 6)

A nearly smooth specimen, otherwise similar to the species.

Samarisporites sp. A (Plate II, 7–8)

Synonyms: "Gen. nov." in Streel 1965, pl. 1, figs. 4–6.

Samarisporites sp. cf. *Hymenozonotrilletes acanthyrugosus* Chibrikova, in Becker et al. 1974, pl. 18, fig. 8.

This form is structurally similar to *Samarisporites triangulatus* from which it could be derived. It has a thick, often dark, spherical central body and a thin

(with a lower *asymmetricus* conodont fauna including *Ancyrodella rotundiloba*).

An almost similar spore assemblage is present in the samples taken below and above the first limestone with "Pentamères" (Unit P) in the Ferques railroad section. This limestone has a middle *asymmetricus* conodont fauna, with *Ancyrodella gigas*. Among the seventeen miospore species belonging to this assemblage are *Corystisporites multispinosus* (42), *Grandispora inculta* (21), *Chelinospora concinna* (38), *Ancyrospora ancyrea* var. *brevispinosa* (14), *Verrucosisporites* cf. *uncatus* (27) and *Archaeozonotriletes variabilis* (2), six species which were given a too short stratigraphical range by Loboziak and Streel (1980). This assemblage may however be distinguished by marking the first occurrence of *Verrucosisporites bullatus* (45), *Ancyrospora simplex* (46), *Hystricosporites multifurcatus* (47), *Convolutispora tegula* (48) and *Planisporites scaber* (49).

Other miospores occur in the lower part of the Formation de Ferques which has an upper *asymmetricus* conodont fauna with *Ancyrodella curvata* (Magne, 1964). The joint first incoming of *Lophozonotriletes media* (50), *Pustulatisporites rugulatus* (51) and *Ancyrospora lysii* (52) was also noted by Taugourdeau-Lantz (1971, tableau 1) in the same Bois quarry as well as the disappearance of *Cirratriradites jekhovskiyi* (39), a typical zonate form, at the top of the Formation de Beaulieu in the La Parisienne quarry. *Verrucosisporites bullatus* was found in the upper part of the Formation de Ferques by Taugourdeau-Lantz (1971) in the La Parisienne quarry, the same locality where Coen (in Brice et al., 1981) has identified *Ancyrognathus triangularis euglypheus* specimens. These last conodont specimens definitely belong to the *Ancyrognathus triangularis* zone sensu Ziegler. (See the related note in Brice et al., 1981.) They are present in the conodont assemblage characterising the upper part ("F2gh") of the "assise de Frasnes" in Belgium.

Productive samples of the Formation d'Hydrequent were obtained only from immediately below and above the dolomitic bed and also from the uppermost part of the Formation.

Near the dolomitic bed (121 and 119 within 2 m below; 117 and 116 within 20 cm above) occur a few typical species most of which are mentioned here in open nomenclature. They are *Grandispora* cf. *tenuispinosa* (53), *Samarisporites* sp. A (54), *Diducites poljessicus* (55), *Grandispora* sp. A (56), *Cymbosporites* sp. B (57) and *Rugospora* cf. *flexuosa* (58). Many species disappear above that level, particularly *Samarisporites triangulatus* (36), *Grandispora tomentosa* (32), *Convolutispora disparalis* (4), *Pustulatisporites rugulatus* (51) and *Ancyrospora lysii* (52).

More significant is the change of microflora observed in the uppermost part of the Formation d'Hydrequent (109, 114 and 113 within 3 m below the top). Thirteen taxa occur in these samples: *Knoxisporites dedaleus* (59), *K.* cf. *hederatus* (60), *Corbulispora* sp. (81), *Auroraspora hyalina* (62), *A. macra* (63), *Diducites plicabilis* (64), *D. versabilis* (65), *Auroraspora* sp. A (66), *Retusotriletes planus* (67), *Cymbosporites* sp. A (68), *Grandispora gracilis* (69), *Auroraspora solisorta* (70) and *Densosporites* spp. (71).

There are no conodont data available from the Formation d'Hydrequent and we have to rely on brachiopods and ostracods.

Most of the Formation including the dolomitic bed should still belong to the Frasnian as this bed contains the last *Ripidiorhynchus ferquensis* (Gosselet), a very typical brachiopod of the underlying Formation de Ferques (Brice and Meats, 1972), and also several Frasnian ostracods (Lethiers in Bonte et al., 1974). Indeed the change in the spore content near the dolomitic bed is not very important compared with the Formation de Ferques assemblage. The ostracod *Favulella lecomptei* is present only in the lower part of the Formation d'Hydrequent. But, in the Ardennes (Casier, 1977) the *Favulella lecomptei* zone ends near the contact of the Formation de Frasnes and the Formation de Neuville where the upper *Ancyrognathus triangularis* subzone sensu Coen (1973) occurs. Therefore we assume that our samples near the dolomitic beds should correspond more or less to that conodont subzone.

On the other hand, the last spore assemblage from the uppermost part of the Formation d'Hydrequent is very different and this suggests a sediment gap or condensation between the dolomitic bed and these samples. To date this uppermost part of the Formation d'Hydrequent which is devoid of any other fossils, it is necessary to rely on the evidence of the spores themselves.

THE BOULONNAIS SPORE ASSEMBLAGES AND THEIR CORRELATION WITH OTHER REGIONS

(1) Loboziak and Streel (1980) recognised the Formation de Blacourt and basal Formation de Beaulieu to contain a *Triangulatus* spore assemblage, firstly described in Spitsbergen by Allen (1965, 1967, 1973) and retained by Richardson (1974) as a major assemblage zone of Givetian—Frasnian age. The joint appearance of *Verrucosisporites bullatus* (45) and *Hystricosporites multifurcatus* (47) within the Formation de Beaulieu introduces another major assemblage zone, the *optivus*—*bullatus* assemblage (Richardson, 1974) of Frasnian age. We consider the latter to extend at least to the top of the Formation de Ferques. These major spore assemblages may now be more accurately dated in terms of the conodont zones: the *triangulatus* assemblage ranging at least from the *obliquimarginatus* Zone to the lower *asymmetricus* Zone¹, the *optivus*—*bullatus* assemblage corresponding to the middle and upper *asymmetricus* Zone and, at least, the lower part of the *Ancyrognathus triangularis* Zone (see Fig. 2).

Both of these assemblages may however be easily subdivided into several regional phases sensu Van der Zwan and Van Veen (1978). From the base to the top of the rock sequences the following may be recognised:

¹Not to be confused with the lowermost *asymmetricus* Zone.

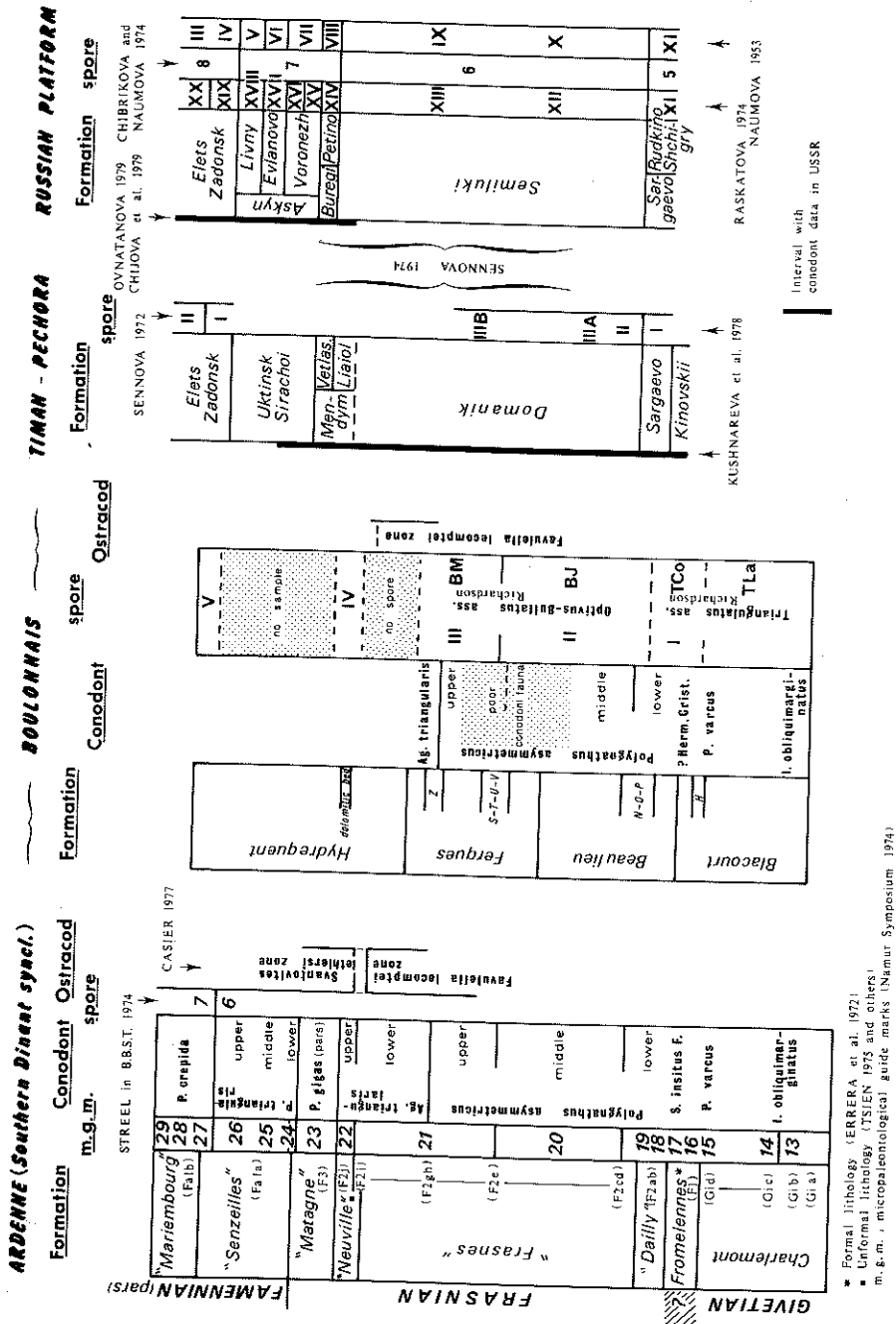


Fig. 2. Correlation chart of the Boullonnais sequence with other regions.

The TL^a phase (*Samarisporites triangulatus*—*Rhabdosporites langii* phase). This phase is reflected by the composition of sample G-02 at the base of the Formation de Blacourt (Griset quarry). It has many species in common with the Givetian Orcadian sequence (see Loboziak and Streel, 1980, p.296).

The TCo² phase (*Samarisporites triangulatus*—*Chelinospora concinna* phase). Synonym: sequence number I in Brice et al. (1981). This phase is reflected by the composition of sample 26 in unit H in the upper part of the Formation de Blacourt (Ferques railroad trench). It is characterized by the joint occurrence of *Chelinospora concinna* (38), *Cirratriradites jekhovskiyi* (39), *Geminospora lemurata* (40), and several so-called "Givetian" species like *Aneurospora goensis* (11), *Ancyrospora ancyrea* var. *ancyrea* (13), *Aurora spora macromanifesta* (16), *Cymbosporites* cf. *cyathus* (20), *Grandispora velata* (22) and *Samarisporites inaequus* (23).

The BJ phase (*Verrucosisporites bullatus*—*Cirratriradites jekhovskiyi* phase). Synonym: sequence number II in Brice et al. (1981). This phase is typified by the composition of sample sequence Q52 to Q56 in the Formation de Beaulieu (Ferques railroad trench). It may be characterised by the joint occurrence of *Verrucosisporites bullatus* (45), *Hystricosporites multifurcatus* (47) and *Cirratriradites jekhovskiyi* (39).

The BM phase (*Verrucosisporites bullatus*—*Lophozonotriletes media* phase). Synonym: sequence number III in Brice et al. (1981). The phase is typified by the composition of samples VW5 and 8 in the Formation de Ferques (Bois quarry). It has a joint occurrence of *Verrucosisporites bullatus* (45), *Lophozonotriletes media* (50) and *Pustulatisporites rugulatus* (51). *Ancyrospora lysii* (52) is sometimes a very typical element of this phase.

Which of the above-mentioned species have to be selected to establish true concurrent range zones will be discussed in a later paper. Then we hope to be able to use this scheme for accurate correlation with other regions.

At this stage, however, it is important to emphasize that the *triangulatus* assemblage of Allen in Spitsbergen might cover a slightly different time span than the *triangulatus* assemblage of Richardson. The former one has *Chelinospora concinna* as a characteristic species of its lower part and therefore could well be mainly Frasnian. The *langii*—*triangulatus* assemblage of Streel in Becker et al. (1974) has a long stratigraphic range extending from the TCo phase of the *triangulatus* assemblage into at least the *optivus*—*bullatus* assemblage. Its subdivision in two subzones (LTi and LTs; Streel in Becker et al., 1974) based on a continental sequence in the Campine Basin (Belgium) has to be revised in the light of the present new data.

¹TL^a: not TL, to avoid a confusion with the former LT Zone of Streel in Becker et al. (1974).

²TCo: not TC, to avoid a confusion with the Viséan TC Zone in Clayton et al. (1977).

(2) The spore assemblage occurring near the dolomitic bed of the Formation d'Hydrequent is too poorly known to be given an accurate definition (see sequence number IV in Brice et al., 1981). This assemblage might be characterised by the joint occurrence of *Samarisporites triangulatus* and *S. sp. A*, the latter being possibly a species derived from the former.

Long-distance correlation on spore evidence are difficult in Frasnian time. This is clearly substantiated by parallelising (see Fig. 2) the spore succession of the Boulonnais with the time equivalent (on conodont evidence) but otherwise very different spore succession of southern Timan (Kushnareva et al., 1978) and their lateral equivalent on the Russian Platform (Sennova, 1974). They most probably belonged to separate phytogeographical areas (Streel, 1981).

(3) The spore assemblage occurring at the uppermost part of the Formation d'Hydrequent (sequence number V in Brice et al., 1981) has several characteristics of the Lower Famennian in the type area of Senzeilles in Belgium (sequence number 7; Streel in Becker et al., 1974) where *Diducites plicabilis* (64) and *D. versabilis* (65) occur in sediments with conodonts of the *crepida* Zone. In the same area the ostracod *Jenningsina lethiersi* Becker ends earlier (at Senzeilles in the underlying *P. triangularis* conodont zone), a situation which is more or less reflected in the Formation d'Hydrequent.

Knoxisporites (*Archaeozonotriletes*) *dedaleus* and small saccate spores like *Hymenozonotriletes hyalinus*, *H. pallidus*, *H. varius*, *H. immensus*, *H. zadonicus*, etc., are common spores of the Zadonsk—Elets "horizons" in various regions of the U.S.S.R. (see Naumova, 1953; Sennova, 1972; Rastakova, 1974; Chibrikova and Naumova, 1974). The Zadonsk—Elets "horizons" were almost always considered to be basal Famennian by Russian authors until new conodont material in the Volga—Ural province (Ovnatanova, 1979; and in Chijova et al., 1979) gave a *P. crepida* Zone as the oldest conodont zone for these "horizons". Compared with the Belgian type sequence, the Zadonsk—Elets "horizons" are better correlated with the "Fa1b" rather than with the "Fa1a" at Senzeilles (see Fig. 2).

Providing that the dolomitic bed of the Formation d'Hydrequent corresponds at least to the upper *A. triangularis* conodont subzone sensu Coen (1973) (which has still to be observed), and the uppermost part of the same Formation to the *P. crepida* Zone (which is probable on spore evidence), there would be in the Boulonnais a large gap in the spore record between our assemblages IV and V where we have no sample. This interval would correspond, on the Russian Platform, to the spore assemblage sequences XIV—XVIII of Rastakova (1974) or more simply to the "super-assemblage" 7 of Chibrikova and Naumova (1974).

It is hoped that further study on the Formation d'Hydrequent will be done in the future.

PLATE I (Description on p. 63)

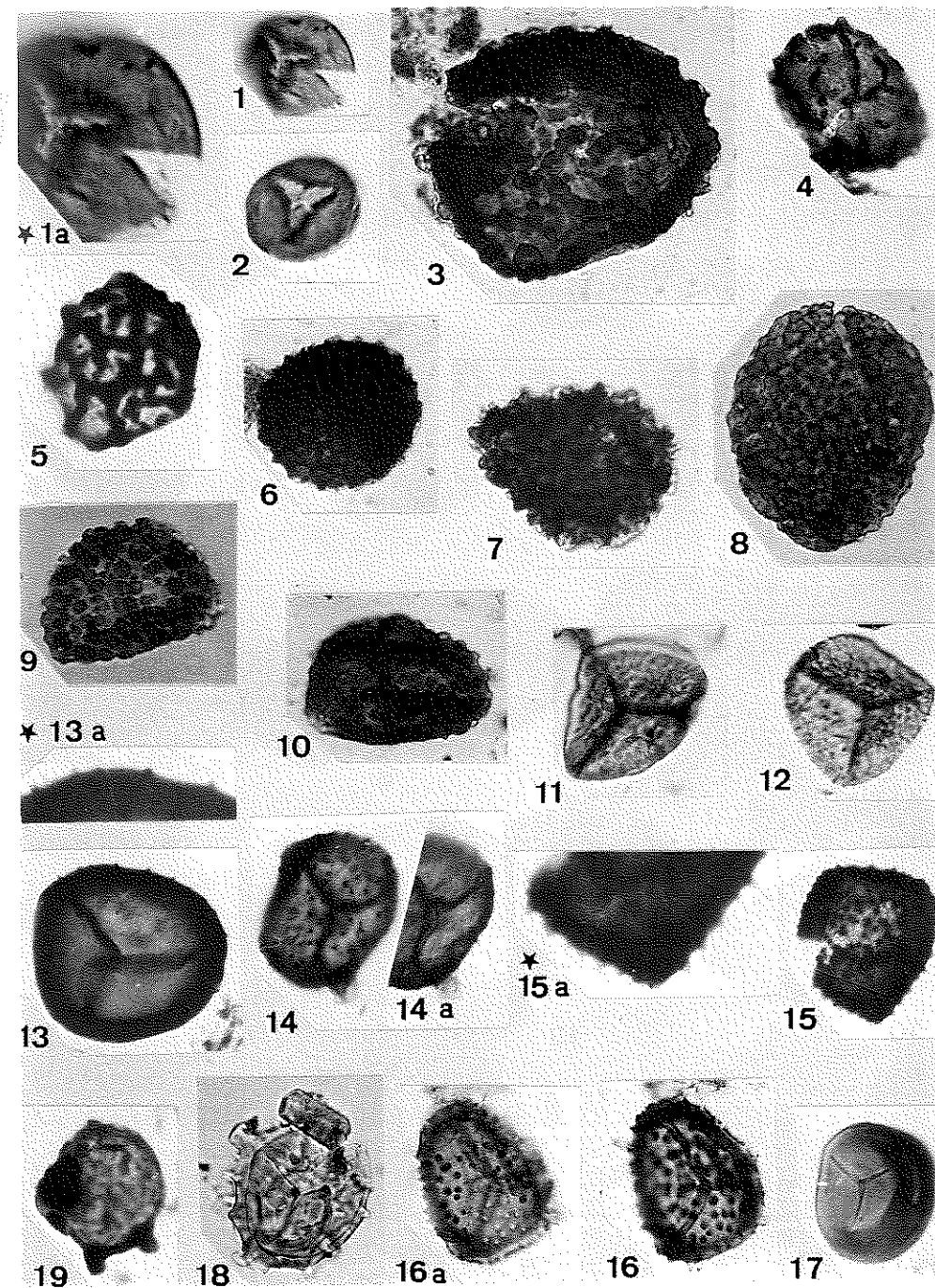


PLATE IV (Description on p. 64)

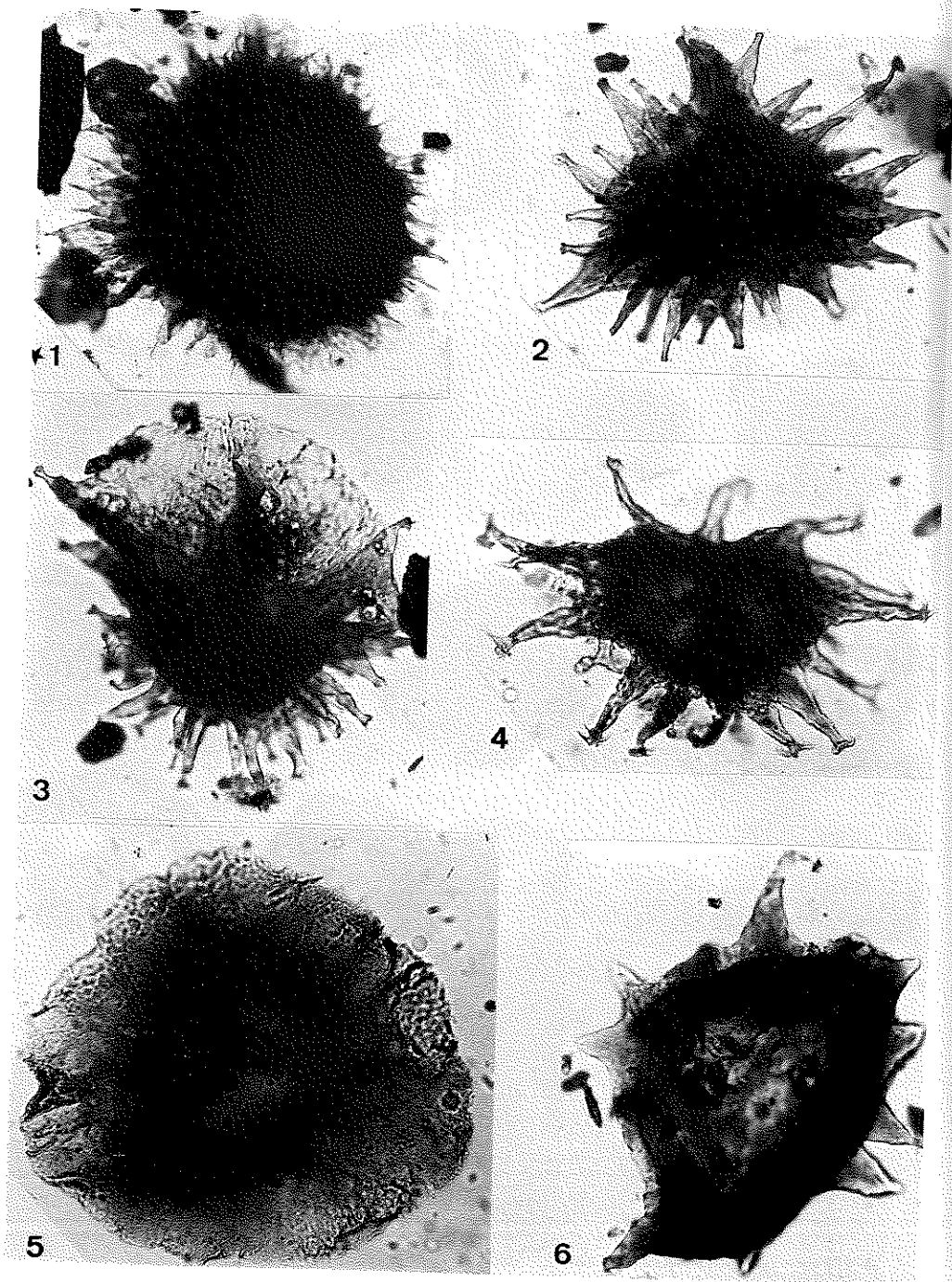


PLATE I (p. 59)

All photographs $\times 500$, except where otherwise stated*. Identification numbers (Fig. 1) are given between brackets; IC = interference contrast.

- 1, 2. (67) *Retusotriletes planus* Dolby et Neves. 1. IC, Slide 114(7), 26/58; 1a, IC, detail of 1, $\times 1000$. 2. IC, Slide 109(6), 23/12.
- 3, 4. (51) *Pustulatisporites rugulatus* (Taugourdeau-Lantz) nov. comb. 3. Slide VW 8(2), 18/75. 4. Slide 114(3), 23/81.
5. *Corbulispora* sp. Slide 114(2), 19/09.
6. *Convolutispora* sp. Slide S 1(2), 05/58.
7. (4) *Convolutispora disparilis* Allen. Slide VW 8(1), 09/55.
8. (48) *Convolutispora tegula* Allen. Slide VW 5(2), 19/34.
- 9, 10. (45) *Verrucosiporites bullatus* Taugourdeau-Lantz. 9. Slide VW 5, 28/19. 10. Slide 05(1), 18/10.
11. (58) *Rugospora* cf. *flexuosa* (Juskho) Streel in Becker et al. IC Slide 117(1), 08/85.
12. (49) *Planisporites scaber* Taugourdeau-Lantz. Slide 117(1), 09/184.
- 13, 14. (68) *Cymbosporites* sp. A. 13. Slide 109(5), 11/73; 13a, detail of 13, $\times 1000$. 14. Slide 114(6), 10/12; 14a, IC, proximal focus.
- 15, 16. (57) *Cymbosporites* sp. B. 15. Slide 116(3), 30/04; 15a, detail of 15, $\times 1000$. 16. Slide 117(1), 08/11; 16a, IC, distal focus.
17. (2) *Archaeozonotriletes variabilis* (Naumova) Allen. Slide VW 5(1), 14/26.
18. (38) *Chelinospora concinna* Allen. Slide 53(3), 17/08.
19. ?Cf. *Cyrtospora cristifer* (Luber) Van der Zwan. Slide 114(1), 13/11.

PLATE II (p. 60)

All photographs $\times 500$.

Identification numbers (Fig. 1) are given between brackets; IC = interference contrast.

- 1-5. (36) *Samarisporites triangulatus* Allen. 1. Slide VW 8(3), 25/68. 2. Slide Z 14(3), 18/77. 3. IC, Slide VW 8(2), 16/57; 3a, IC, distal focus. 4. Slide Z 15(2), 10/78. 5. Slide Z 16(2), 22/19.
6. *Samarisporites* cf. *triangulatus* Allen. Slide 116(2), 21/19.
- 7, 8. (54) *Samarisporites* sp. A. 7. Slide 114(5), 18/44. 8. Slide 109(2), 01/38.
9. *Samarisporites* sp. Slide Q52(1), 21/02.
10. *Densosporites* sp. Slide 117(2), 22/53.
11. *Densosporites* sp. Slide 117(3), 11/42.
12. (39) *Cirratiradites jekhovskyi* Taugourdeau-Lantz. Slide S1(1), 21/99.
13. (69) *Grandispora gracilis* (Kedo) Streel in Becker et al. Slide 09(1), 24/10.
14. (21) *Grandispora inculta* Allen. IC, Slide 117(1), 14/44.
15. (32) *Grandispora tomentosa* Taugourdeau-Lantz. Slide 05(1), 26/40.
16. (56) *Grandispora* sp. A. Slide 117(1), 12/53.

PLATE III (p. 61)

All photographs $\times 500$, except where otherwise stated*. Identification numbers (Fig. 1) are given between brackets; IC = interference contrast.

1. (35) *Rhabdosporites parvulus* Richardson. Slide 05(1) 19/102.
2. (40) *Geminospora lemurata* Balme. Slide VW 8(1), 26/27.
3. (70) *Auroraspora solisorta* Hoffmeister, Staplin et Malloy. Slide 114(1), 21/98.
4. (63) *Auroraspora macra* Sullivan, Slide 114(1), 14/86. 4a, IC.
5. (62) *Auroraspora hyalina* (Naumova) Streel in Becker et al. Slide 109(1), 10/32.
6. (66) *Auroraspora* sp. A. Slide 114(2), 17/19. 6a, central body.
7. (55) *Diducites poljessicus* (Kedo) Van Veen. Slide 114(3), 23/82.
8. (64) *Diducites plicabilis* Van Veen. IC, Slide 114(2), 16/50.

9. (65) *Diducites versabilis* (Kedo) Van Veen. IC, Slide 114(5), 14/59.
10. (50) *Lophozonotriletes media* Taugourdeau-Lantz. Slide VW 8(1), 16/79.
11. (59) *Knoxisporites dedaleus* (Naumova) StreeL. Slide 109(3), 14/91.
12. (60) *Knoxisporites cf. hederatus* (Ishchenko) Playford. Slide 114(2), 16/03.
13. (12) *Contagisporites optivus* (Chibrikova) Owens. Slide VW 5(1), 09/78, $\times 300$.

PLATE IV (p. 62)

All photographs $\times 300$, except where otherwise stated*. Identification numbers (Fig.1) are given between brackets.

1. (42) *Corystisporites multispinosus* Richardson. Slide 05(1), 21/50, $\times 500$.
2. (31) *Ancyrospora langii* (Taugourdeau-Lantz) Allen. Slide Z 14(1), 20/30.
- 3, 4. (47) *Hystricosporites multifurcatus* (Winslow) Mortimer et Chaloner. 3. Slide Z 14(2), 22/71. 4. Slide VW 8(1), 17/43.
5. (52) *Ancyrospora lysii* (Taugourdeau-Lantz) nov. comb. Slide VW 22(1), 10/22.
6. (46) *Ancyrospora simplex* Guennel. Slide Z 14(2), 14/69.

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ASPECTS OF LATE DEVONIAN AND EARLY CARBONIFEROUS PALYNOLOGY OF SOUTHERN IRELAND. V. THE CHANGE IN COMPOSITION OF PALYNOLOGICAL ASSEMBLAGES AT THE DEVONIAN–CARBONIFEROUS BOUNDARY

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ABSTRACT

Van Veen, P.M., 1981. Aspects of Late Devonian and Early Carboniferous palynology of southern Ireland. V. The change in composition of palynological assemblages at the Devonian–Carboniferous boundary. *Rev. Palaeobot. Palynol.*, 34: 67–97.

The application of the appearance of the conodont *Siphonodella sulcata* as new faunal criterion for correlation of the Devonian–Carboniferous boundary has recently been recommended. This paper aims at a better palynological characterization of the systemic boundary interval. It provides a description of the compositional change of palynological assemblages in southern Ireland, exemplified by data from the Ballycrovane Harbour and Bantry Bay sections (Co. Cork). This palynological succession is taken as a standard for the palynological picture of the interregional floral development. Palynologically the most distinct floral change is taking place during the *Retispora lepidophyta*–*Cyrtospora cristifer* (LCr) Phase. This phase is characterized by the drastic diminishment and subsequent disappearance of typical Late Devonian elements, such as the biostratigraphically important *Retispora lepidophyta*. The sudden quantitative change can be interregionally recognised. It is probably the result of climatic changes and nearly concurs with the entry of the conodont *Protognathodus kuehni*. On the other hand, a palynological characterization of the entry of *Siphonodella sulcata* is uncertain and it presumably takes place during the LCr Phase. From a palynological point of view, alternative criteria for correlation of the Devonian–Carboniferous boundary ought still to be considered.

INTRODUCTION

In chronostratigraphy, boundaries are subject of continuous interest. One of the causes of research on this subject matter is the increasing accuracy of micropalaeontological versus macropalaeontological methods. Generally this accuracy will result in redefinition of chronostratigraphical boundaries. Following this process, the Devonian–Carboniferous boundary, formerly defined by the income of the ammonoid *Gattendorfia subinvoluta*, will probably become defined by the income of the conodont *Siphonodella sulcata*. Such a definition has recently been recommended by the Working