Dinocyst distributions and stratigraphy of two Cenomanian–Turonian boundary (Upper Cretaceous) sections from the western Anglo-Paris Basin

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ABSTRACT - The dinoflagellate cyst distributions and stratigraphies of two representative Cenomanian/Turonian (C/T) boundary sections from the Maine and Normandy regions of northern France are described. Siliciclastic-rich sediments which characterize the Upper Cenomanian in Maine, contrast with the coeval nodular chalk and hardground lithofacies of Normandy. Both areas display a transition to marly chalks in the Lower Turonian. Dinocyst assemblages are characterized by low diversities (38 taxa) and low overall abundances, and relatively few stratigraphically significant species. The continued occurrence of Epilidiosphaeridia spinosa (Cookson & Hughes) Davey in the Upper Cenomanian of Maine is noted. Results are compared and contrasted with those from coeval sections elsewhere in the Anglo-Paris Basin. A major decline in cyst abundance and diversity is typical of the C/T boundary interval, which is characterized by a dominance of tolerant cosmopolitan forms such as Circuloidinium distinctum (Deflandre & Cookson) Jansonius, Hystrichosphaeridium bowerbankii (Davey & Williams, Oligosphaeridium complex (White) Davey & Williams, Odontochitina costata Alberti; emend. Clarke & Verdier and O. operculata (O. Wetzel) Deflandre & Cookson. J. Micropalaeanotol. 14(2): 97–105, October 1995.

INTRODUCTION
The Cenomanian/Turonian (C/T) boundary marks one of the most significant periods of biotic turnover in the Mesozoic (Raup & Sepkoski, 1982), with major changes in macro-, micro- and nannofossil assemblages occurring across the boundary interval worldwide (Bralower, 1988; Jarvis et al., 1988a; Elder, 1991; Hart & Leary, 1991; Kennedy & Cobb, 1991; Peryt & Wyrwicka, 1991; Schönfeld et al., 1991; Gale et al., 1993; Harries, 1993; Robaszynski & Gale, 1993; Ulicny et al., 1993). The causes of this turnover remain hotly debated (Corfield et al., 1990; Jeans et al., 1991; Ulicny, 1992; Orth et al., 1993), but it is associated with a major palaeoceanographic event which led to the widespread accumulation of organic-rich sediments in the ocean basins, and produced a distinctive positive carbon stable-isotope excursion in marine carbonates and organic matter (Schlanger et al., 1987; Arthur et al., 1988; Jarvis et al., 1988a; Pratt et al., 1991; Hilbrecht et al., 1992; Gale et al., 1993); the so-called C/T oceanic anoxic event (OAE2) of Schlanger & Jenkyns (1976).

Despite such widespread interest, detailed palynological studies across the C/T boundary are still relatively rare (e.g. Jarvis et al., 1988a; b; Marshall & Batten, 1988; Courtinat et al., 1991). The present work describes the dinoflagellate cyst distributions of two boundary successions located close to the western edge of the Anglo-Paris Basin. The sequence stratigraphy and depositional setting of this area has been described recently by Juignet & Breton (1992). The sections studied are representative of two distinct palaeogeographic areas, the ‘Maine Platform’ and ‘Normandy Basin’. Throughout the Cenomanian, Maine accumulated relatively thick sequences of siliciclastic sediment derived from the Armorican Massif immediately to the west. At the same time in Normandy, to the NE, only attenuated successions of pelagic chalk were deposited. However, with the progressive rise in eustatic sea-level through the Cenomanian (Haq et al., 1987; Hancock, 1989; Juignet & Breton, 1992), sedimentological differences between the two areas declined and chalk sedimentation dominated in both areas by the Early Turonian.

Duneau (Figs 1–3), ENE of Le Mans, exposes a typical Maine sequence, with the transition from Upper Cenomanian sands and sandstones to Lower Turonian chalks. Normandy successions are exemplified by St-Sylvestre-de-Cormeilles near Rouen (Figs 4, 5), where the C/T transition comprises of marly and nodular chalks with well-developed hardgrounds. Twelve 20 g samples from Duneau and 9 samples from St-Sylvestre-de-Cormeilles were processed using standard palynological acid digestion techniques, and the resultant strew mounts were examined under a light microscope. Dinoflagellate cyst records (see Appendix 1) were plotted against detailed lithological logs and compared with macrofossil evidence to assist interpretation of the palynological data. Preparations are stored in the reference collection of the Palynological Research Centre, Institute of Earth Studies, University of Wales, Aberystwyth, UK.

DUNEAU
Les Fosses Blanches Quarry (Terres Blanches Marl Pit of Doré et al., 1987; coordonnées Lambert de l’Institut géographique National de France: x = 464,18; y = 341,67) is situated 1 km SW of the village of Duneau (Fig. 1). 25 km ENE of Le Mans, Sarthe. The area lies within the Cenomanian type region (Juignet, 1980; Birkelund et al., 1984), and sections in the vicinity of the village have been used to define the top of the stage (Juignet et al., 1973; Robaszynski, 1984). Approximately 14 m of Cenomanian–Turonian sediments (Figs 2, 3) are exposed at Les Fosses
The regional map (upper right) shows the position of the study area in relation to the Cretaceous Anglo-Paris Basin (horizontal ornament).

**Fig. 1.** Calcareous nodules which give the sediment a distinctive yellow, medium-grained, glauconitic sands containing large 98 und 2 of Juignet (1974), which occurs at the top of the sand Hardground (Juignet, 1974; Juignet labius. Rare calcareous nodules and occasional small flints are present in the upper part of the succession.

**Biostratigraphy**
No macrofauna was collected from the Sables du Perche at this quarry, although terebratulid brachiopods Gemmariambicula menardi (Lamark) and internal moulds of bivalves have been recorded (Guillier, 1886; Juignet et al., 1973; Juignet, 1974) from the top of the formation at nearby exposures (Chemin du Grand-Crozet and Duneau village sections). The Sables du Perche are generally regarded as lying within the low Upper Cenomanian Calycoceras guerangeri ammonite Zone, although all three samples (Dun. 1–3) collected for palynological analysis proved to be barren.

Abundant specimens of Pycnodonte biauriculata (Lamark) oysters occur in the soft glauconitic marly chalks (Marnes à 'O. biauriculata) that overlie the Sables du Perche at Duneau. Correlation with ammonite-bearing sections elsewhere in the region (Juignet, 1974) indicates that these chalks also fall within the upper C. guerangeri Zone. A sample (Dun. 4) collected from this level contained a low diversity and low abundance dinoflagellate cyst assemblage (Fig. 3), comprising only 17 species and less than 100 individuals. None of the cysts recorded is particularly significant stratigraphically over this interval, although the occurrence of a single specimen of Epelidosphaeridia spinosa (Cookson & Hughes) Davey is worthy of note. The last common occurrence of this species is generally regarded (Foucher, 1981; Costa & Davey, 1992) as indicative of the top of the Middle Cenomanian. However, recent work on C/T boundary sections in southern England (Tocher & Jarvis, unpublished data) confirms that rare specimens are found in the Upper Cenomanian.

The Sables à C. obtusus are represented by a thin indurated limestone containing abundant Rynchostreon suborbiculatum (Lamark) oysters. There are no other macrofaunal records for this level at Les Fosses Blanches Quarry, but a relatively rich assemblage has been described (Juignet et al., 1973; Juignet, 1974) from the Sables à C. obtusus exposed in the Chemin du Grand-Crozet section. This fauna is typical of the mid-Upper Cenomanian Metiococeras geslinianum ammonite Zone. Only five species of dinoflagellate cysts were recorded from this formation (Fig. 3; Dun. 5), none of which is stratigraphically significant.

The Craie à T. carantonensis yields Sciponoceras sp., common Rastellum (Arirotreaster) carinatum (Lamark) and Pycnodonte sp. oysters, plus terebratulid brachiopods. Several remains of ammonites, M. cf. geslinianum (d'Orbigny), Sciponoceras gracile (Shumard) and Calycoceras (Calycoceras) naviculare (Mantell) have been

**Lithological key:**
- white chalk
- marly chalk
- blocky sandstone
- glauconite sand
- quartz gravel
- nodular flint
- shell debris
- massive hardground
- nodular hardground
- calcareous nodules

**Fig. 2.** Key to main lithologies occurring in the Duneau and St-Sylvestre-de-Cormeilles sections (Figs 3, 5).

Blanches, in a small working chalk quarry and an adjacent sand pit. The locality displays one of the best exposures of Lower Turonian in the area (Juignet & Lebert, 1987); parts of the section have been described previously by Juignet (1974) and Woodroof (1981).

**Lithostratigraphy**
The sand pit exposes the upper part of the Sables du Perche, yellow, medium-grained, glauconitic sands containing large calcareous nodules which give the sediment a distinctive rubbly appearance. The top of the formation is taken at the surface of a blocky hardground (Fig. 3), Duneau Hardground 2 of Juignet (1974), which occurs at the top of the sand pit. This hardground forms the floor of the chalk quarry, where it is overlain by a thin sequence of glauconite- and quartz-rich, marly chalks, assigned to the Marnes à 'Ostrea' biauriculata. The contact with the overlying Sables à Catopygus obtusus is sharp. The latter formation is represented here by 30 cm of grey nodular indurated sandy limestone, the top of which corresponds to the Bousse Hardground (Juignet, 1974; Juignet & Breton, 1992).

The overlying Mézières erosion surface, which generally marks the top of the Sables à C. obtusus, appears to have been superimposed onto the surface of the Bousse Hardground in this section, although the two surfaces are separated by 40 cm of sandy limestone in exposures at Chemin du Grand-Crozet, also near Duneau (Juignet 1974). Above the Sables à C. obtusus lies the Craie à Terebratella carantonensis, glauconitic marly chalks with an abundant macrofauna resting on a basal layer rich in quartz gravel. This formation passes upwards without a marked break into monotonous grey marly chalks of the Craie à 'Inoceramus' labius. Rare calcareous nodules and occasional small flints are present in the upper part of the succession.
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| Number of specimens present | 1 - 5 | 6 - 10 | 11 - 20 |
|-----------------------------|-------|--------|---------|
| **Stage** | **Zone** | **Formation** | **Samples** | **Lithology** |
| Dun.12 | Dun.11 | | | Marker beds |
| Dun.10 | Dun.9 | | | |
| Dun.8 | Dun.7 | | | |
| Dun.6 | Dun.5 | Dun.4 | Dun.3 | Bousse Hardground |
| Dun.2 | Dun.1 | | | Duneau Hardground 2 |
| | | | | |

**Fig. 3.** Stratigraphy and dinocyst distribution across the Cenomanian–Turonian boundary at Les Fosses Blanches Quarry, Duneau. See Fig. 2 for lithological key.

Juignet (1974) recorded numerous specimens of *Mytiloides* sp. bivalves and *Orbirhynchia cuvieri* (d’Orbigny) brachiopods from the marly chalks overlying the Craie à *T. carantonensis*, indicating an Early Turonian age for the Craie à ‘*Inoceramus*’ labiatus. Woodroof (1981) placed the lower part of the latter formation in his *Mytiloides* cf. *opalensis* [= *M. columbianus* (Heinz), see Hancock, 1991; = *M. kossmati* (Heinz), see Walaszczyk, 1992] Zone, while the uppermost 2 m of the section (Fig. 3; including our samples Dun. 11, 12) lie within his *M. mytiloides* Zone. Six
palynological samples (Dun. 7–12) taken from the Craie à ‘Inoceramus’ labiatus produced only occasional specimens of mostly cosmopolitan taxa such as Circulodinium distinctum (Deflandre & Cookson) Jansonius, Heterosphaeridium? heteracanthum (Deflandre & Cookson) Eisenack & Kjellstrom, Hystrichosphaeridium bowenbankii Davey & Williams, Odontochitina operculata (O. Wetzel) Deflandre & Cookson and Oligosphaeridium complex (White) Davey & Williams.

**ST-SYLVESTRE-DE-CORMEILLES**
The Bois du Gallet Marl Pit (x = 460,56; y = 173,10) is a large quarry situated within the Commune de St-Sylvestre-de-Cormeilles, Eure (Fig. 4), which exposes 12 m of marly chalks. The quarry was noted as the only working marl pit in the area by Juignet (1971), but has subsequently been abandoned. The upper part of the succession was described by Juignet (1974).

**Lithostratigraphy**
The section (Fig. 5) displays the upper part of the Craie d’Antifer (following the terminology of Juignet & Breton, 1992; = Craie à Actinocamax plenus of the older literature) and the base of the Craie à ‘Inoceramus’ labiatus. The Craie d’Antifer is characterized by light grey marly chalks separated by two massive-topped nodular hardgrounds with glauconitized surfaces which are penetrated by numerous Thalassinoides burrows containing un lithified chalk fills. The lower hardground is correlated with Antifer Hardground 2 of Juignet (1974); the upper corresponds to Antifer Hardground 3.

Approximately 3 m of light grey nodular chalks overlie the surface of Antifer Hardground 3 and are followed by a thicker succession of creamy white marly chalks with occasional bands of grey nodular flints. This sequence constitutes the Craie à ‘I.’ labiatus.

**Biostratigraphy**
No diagnostic macrofauna was found in the Craie d’Antifer at this locality. However, correlation with faunally richer successions in the Lieuvin and the Pays de Caux (Juignet, 1974), indicates that the formation lies within the M. geslinianum Zone (mid-Upper Cenomanian). Three samples (StS. 1–3) were processed for their palynomorph content, each yielding a moderately diverse (up to 25 taxa) but low abundance dinoflagellate cyst assemblage (Fig. 5). The lower two samples (StS. 1, 2) contain common Odontochitina operculata (Pl. 1, fig. 11), while sample StS. 3 is dominated by O. costata Alberi; emend. Clarke & Verdier (Pl. 1, fig. 13), and to a lesser extent, Cyclonephelium compactum Deflandre & Cookson. The presence of the latter species suggests that this formation is Late Cenomanian (C. guerangeri ammonite Zone) or younger (Marshall & Batten, 1988); this is supported (see Jarvis et al., 1988a) by the occurrence of Kallo sphera? ringnesiorum (Manum & Cookson) Helby (Pl. 1, fig. 9) in the basal sample (StS. 1).

Specimens of Cenomanian Inoceramus pictus (J. de C. Sowerby) bivalves were recovered from the lowest beds of the Craie à ‘I.’ labiatus. The base of the Turonian is marked by the incoming of Mytiloides sp. bivalves which appear immediately above the second nodular chalk in the succession (Fig. 5). The base of the formation corresponds, therefore, to the N. juddii Zone (Wright & Kennedy, 1981). Two samples (StS. 4–5) taken from this interval yielded a low abundance and low diversity cyst assemblages comprising only a few specimens of Circulodinium distinctum (Pl. 1, fig. 2), Cyclonephelium clathromarginatum Cookson & Eisenack, C. compactum, C. membraniphorum Cookson & Eisenack (Pl. 1, fig. 3), Hyst-richosphaeridium bowenbankii, K.? ringnesiorum, Odontochitina costata, O. operculata and Oligosphaeridium complex.

Occasional Mytiloides sp. occur throughout the upper beds in the succession. Four Turonian samples were processed for palynomorphs (StS. 6–9) but yielded only relatively poor dinoflagellate cyst assemblages. The first appearance of the Lower Turonian marker Senonisphaera rotundata Clarke & Verdier (StS. 8; Pl. 1, fig. 12) and the continued presence of Kiokansium univerculatum (Tasch) Stover & Eivit suggest that the top of the studied section is no younger than Early Turonian (Foucher, 1981; Tocher & Jarvis, 1987; Jarvis et al., 1988a).

**DISCUSSION**
Samples analysed from both areas are characterized by low diversity (a total of 38 taxa) and low abundance dinoflagellate cyst assemblages, although somewhat better recoveries were obtained from the Normandy section (St-Sylvestre-de-Cormeilles). Few of the key Upper Cenomanian–Lower Turonian marker species (Foucher, 1981; Tocher & Jarvis, 1987; Jarvis et al. 1988a) were recorded, making precise dating of these sections on the basis of their palynomorph content difficult. This is partly a consequence of the relatively short stratigraphic interval sampled, since in other studies (Robaszkynski et al., 1982; Tocher & Jarvis, 1987; Jarvis et al., 1987, 1988a) the
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The incoming of low Turonian marker species has been shown to occur many metres above the stage boundary.

The very limited assemblages recovered from the lower part of the Duneau section (Fig. 3) can be explained, at least in part, by the composition of the sediments. The sandy nature of the section, with well-developed hardgrounds is consistent with the marginal, relatively shallow-water setting for C/T deposition in Maine. Similarly impoverished assemblages have been described (Jarvis et al., 1988b) from coeval sands and limestones developed adjacent to the Cornubian Massif, exposed at Hooken Cliffs in SE Devon, England.

Looking at the cyst assemblages as a whole (particularly abundance and diversity patterns) it is possible to see other similarities between the distributions recorded here and those described from Devon (Jarvis et al., 1988b) and Dover (Jarvis et al., 1988a). This is particularly true of assemblages from St-Sylvestre-de-Cormeilles and Dover where the uppermost Cenomanian is characterized by relatively high numbers of O. operculata and O. costata, and the Lower Turonian is typified by very low abundance, low diversity assemblages dominated by long-ranging taxa, particularly C. distinctum, H. bowerbankii, O. operculata and O. complex. However, cysts disappear entirely from the uppermost Cenomanian and basal Turonian sediments at Dover, whereas at both Duneau and St-Sylvestre-de-Cormeilles, despite a major decline, it is possible to find rare cysts at this level.

The continued occurrence of dinoflagellate cysts across the C/T boundary in western France might be a consequence of the marginal depositional setting of the area. More turbulent water conditions and better mixing are likely to have led to the region being less affected by the major palaeoceanographic changes which have been inferred for deeper water areas within the Anglo-Paris Basin and elsewhere (e.g. Schlanger et al., 1987; Jarvis et al., 1988a; Hilbrecht et al., 1992; Ulicny et al., 1993). Perhaps more importantly, however, major lithological differences between the two areas mean that palynomorphs have a higher preservation potential in the marliferous chalks of the French

Fig. 5. Stratigraphy and palynomorph distribution across the Cenomanian–Turonian boundary at Bois du Gallet Marl Pit, St-Sylvestre-de-Cormeilles. See Fig. 2 for lithological key.
localities, than in the highly nodular, reworked and cemented limestones (Melbourn Rock Beds) which constitute the C/T boundary interval at Dover.

CONCLUSIONS
Dinoflagellate cyst assemblages recovered from samples taken across representative Cenomanian/Turonian boundary sections in Maine and Normandy are of low abundance and low diversity. Stratigraphic marker species are rare, making precise dating very difficult on the basis of palynomorphs alone. However, comparison with published data from coeval marginal sections elsewhere in the Anglo-Paris Basin show broad similarities both in terms of the lithofacies present and overall cyst distribution patterns.

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APPENDIX 1
List of taxa recorded. See Lentin & Williams (1993) for full reference details. Locality records (Dun. = Dunede; StS. = St-Sylvestre-de-Cormeilles) and figured taxa (details in parentheses) are indicated.

Aptedinium deflandrei (Clarke & Verdier, 1967) Lucas-Clark, 1987; StS.
Calliosphaeridium asymmetricum (Deflandre & Courteville, 1939) Davey & Williams, 1966; Dun., StS.
Canninginopsis colliveri (Cookson & Eisenack, 1960) Backhouse, 1988; StS.
Circulodinium distinctum (Deflandre & Cookson, 1955) Jansonius, 1986; Dun., StS. (Pl. 1, fig. 2).
Cleistosphaeridium armatum (Deflandre, 1937) Davey, 1969; Dun., StS.
C. clavulum (Davey, 1969) Below, 1982; StS.
Coronifera oceanica Cookson & Eisenack, 1958; emend. May, 1980; Dun., StS.
Cyclonephelium clathromarginatum Cookson & Eisenack, 1962; StS.
C. compactum Deflandre & Cookson, 1955; StS.
C. membraniphorum Cookson & Eisenack, 1962; Dun., StS. (Pl. 1, fig. 3).
Dapsilidinium laminaspinosum (Davey & Williams, 1966) Lentin & Williams, 1981; Dun., StS.
Ellipsodinium rugulosum Clarke & Verdier, 1967; StS. (Pl. 1, fig. 8).
Endoscrinium campanula (Gocht, 1959) Vozzhennikova, 1967; StS. (Pl. 1, fig. 1).
Epelidosphaeridia spinosa (Cookson & Hughes, 1964) Davey, 1969; Dun.
Exochosphaeridium phragmites Davey et al., 1966; StS.
Florentinia deanei (Davey & Williams, 1966) Davey & Verdier, 1973; StS.
F. mantellii (Davey & Williams, 1966) Davey & Verdier, 1973; StS.
Heterosphaeridium? heteracanthum (Deflandre & Cookson, 1955) Eisenack & Kjellstrom, 1971; Dun., StS.
Hystrichodinium pulchrum Deflandre, 1935; StS.
Hystrichosphaeridium bowerbankii Davey & Williams, 1966; Dun., StS.
H. tubiferum tubiferum (Ehrenberg, 1838) Deflandre, 1937; emend. Davey & Williams, 1966; Dun., StS.
Kallosphaeridium? ringnesiorum (Manum & Cookson, 1964) Helby, 1987; Dun., StS. (Pl. 1, fig. 9).
Kiokansium unituberculatum (Tasch, 1964) Stover & Evitt, 1978; Dun., StS.
Leberidocysta deflocata (Davey & Verdier, 1973) Stover & Evitt, 1978; StS. (Pl. 1, fig. 4).
Odontochitina costata Alberti, 1961; emend. Clarke & Verdier, 1967; Dun., StS. (Pl. 1, fig. 13).
O. operculata (O. Wetzel, 1933) Deflandre & Cookson, 1955; Dun., StS. (Pl. 1, fig. 11).
Oligosphaeridium complex (White, 1842) Davey & Williams, 1966; Dun., StS. (Pl. 1, fig. 5).
O. prolisspinosum Davey & Williams, 1966; Dun., StS. (Pl. 1, fig. 6).
Palaeohystrichophora influsorioides Deflandre, 1935; Dun., StS.
Prolixosphaeridium conulum Davey, 1969; Dun., StS. (Pl. 1, fig. 10).

Explanation of Plate 1
Representative Upper Cenomanian-Lower Turonian dinoflagellate cysts from Duneau and St-Sylvestre-de-Cormeilles. Figure captions include species name, author(s), sample number, preparation number, and England Finder co-ordinates. Samples are deposited in the reference collection of the Palynological Research Centre, Institute of Earth Studies, Aberystwyth. All specimens were photographed at ×500, unless otherwise stated.

Fig. 1. Endoscrinium campanula (Gocht, 1959) Vozzhennikova, 1967, StS. 1, WHP/324, Y44. Fig. 2. Circulodinium distinctum (Deflandre & Cookson, 1955) Jansonius, 1986, StS. 3, WHP/326, G47/4. Fig. 3. Cyclonephelium membraniphorum Cookson & Eisenack, StS. 4, WHP/327, O55. Fig. 4. Leberidocysta deflocata (Davey & Verdier, 1973) Stover & Evitt, 1978, StS. 1, WHP/324, W30. Fig. 5. Oligosphaeridium complex (White, 1842) Davey & Williams, 1966; StS. 1, WHP/324, X36/3. Fig. 6. Oligosphaeridium prolisspinosum Davey & Williams, 1966; StS. 1, WHP/324, Q55. Fig. 7. Peridinium cingulum (O. Wetzel, 1933) granulatum (Clarke & Verdier, 1967) Lentin & Williams, 1981, StS. 2, WHP/325, V40/4. Fig. 8. Ellipsodinium rugulosum Clarke & Verdier, 1967, StS. 1, WHP/324, K59/1. Fig. 9. Kallosphaeridium? ringnesiorum (Manum & Cookson, 1964) Helby, 1987, StS. 1, WHP/324, T40. Fig. 10. Prolixosphaeridium conulum Davey, 1969, StS. 2, WHP/325, K32/2 ×500. Fig. 11. Odontochitina operculata (O. Wetzel, 1933) Deflandre & Cookson, 1955, StS. 1, WHP/324, J43/2. Fig. 12. Senonisphaera rotundata Clarke & Verdier, 1967, StS. 8, WHP/331, S35/2. Fig. 13. Odontochitina costata Alberti, 1961; emend. Clarke & Verdier, 1967, StS. 2, WHP/325, H33/2 ×250.
Pterodinium cingulum (O. Wetzel, 1933) granulatum (Clarke & Verdier, 1967) Lentin & Williams, 1981; StS (Pl. 1, fig. 7).
Senonisphaera rotundata Clarke & Verdier, 1967; StS (Pl. 1, fig. 12).
Spinniferites ramosus ramusus (Ehrenberg, 1838) Mantell, 1854; Dun., StS.
S. twistringiensis (Maier, 1959) Fensome et al., 1990; Dun., StS.
Surculosphaeriadum? longifurcatum (Fition, 1952) Davey et al., 1966; StS.
Tanyosphaeridium salpinx (Maier, 1959) Dun., StS.
Valensiella reticulata (Davey, 1969) Courtinat, 1989; StS.
Xenascus ceratioides (Delalandre, 1937) Lentin & Williams, 1973; Dun., StS.

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