

Jurassic dinocysts from the Warboys Borehole, Cambridgeshire, England

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ABSTRACT—The stratigraphic distribution of dinocysts in sediments of Toarcian to early Oxfordian age from the Warboys Borehole, Cambridgeshire are described. Several forms have relatively restricted ranges and appear to be of stratigraphic value. Selected forms are illustrated.

INTRODUCTION

The IGS Warboys Borehole, Broughton, Cambridgeshire (TL 2903 7839) was drilled in early 1965 (Fig. 1) as part of an investigation into geophysical anomalies in the western Fens, and proved the following sequence:

	Thickness (metres)	Depth (metres)
Pleistocene:		
Drift Deposits	1.295	1.295
Jurassic:		
Oxford Clay	63.272	64.567
Kellaways Beds	5.511	70.078
Cornbrash	1.220	71.298
Blisworth Limestone	3.886	75.184
Upper Estuarine 'Series'	1.436	76.620
Grantham Formation	10.527	87.147
Upper Lias	8.967	96.114
Middle and Lower Lias	74.345	170.459
Pre Jurassic:		
Diorite (age uncertain)	46.711	217.459
	Bottom of Hole	

An excellent account of the sediments studied is given in Chapters 11 to 14 of Sylvester-Bradley & Ford (1968). The strata accumulated in the 'Oxfordshire shallows', (a swell region, close to the western edge of the London landmass), in a shallow water, mainly marine sedimentary régime.

The ammonite zonation used in this account is the work of Callomon (unpublished data, 1966) who proved a complete Callovian zonal sequence; those zones sampled for this study are shown in Fig. 2. The zonal sequence from the Toarcian to the Bathonian is incomplete and may be explained by both non-deposition and erosion.

This study is part of a project aiming at a refined zonation of the British Jurassic using dinocysts. The assemblage slides and figured material is housed in the MPA and MPK collections respectively, of the Institute of Geological Science, Leeds.

PALYNOLOGICAL ANALYSIS

Twenty-six samples were prepared for palynological study (Table 1). The residues were found to be dominated by miospores, plant cuticle and wood debris. This dominance of land plant derived material strongly suggests that the sediments accumulated in a relatively nearshore environment.

Rich, well-preserved dinocyst assemblages were encountered in all but two of the samples. Many of the taxa recognised have relatively long ranges although several with more restricted ranges appear to be stratigraphically useful.

STRATIGRAPHIC DISTRIBUTION OF DINOCYSTS

The distribution of the dinocyst taxa is outlined in Fig. 2.

TOARCIAN/AALENIAN (87.325–79.248 m.) – This interval is characterised by a low dinocyst diversity. *Nannoceratopsis gracilis* Alberti, 1961 is abundant at the Toarcian/Aalenian boundary, but has a total range of Pleinsbachian to Bathonian (Thusu, 1978). *Nannoceratopsis ambonis* Drugg, 1978 is very characteristic of the Aalenian in Britain; it has never been encountered in the Lias.

Two samples taken from the Grantham Formation (at 79.248 m. and 82.296 m.) proved to be barren of marine palynomorphs (dinocysts, acritarchs and tasmanitids). The palynomorphs are entirely terrestrially derived, indicating that the sediment accumulated in a non-marine environment.

BATHONIAN/EARLY CALLOVIAN (76.200–70.104 m.) – A number of taxa make their first appearance in the Upper Estuarine 'Series' (76.200 m.). Several of these taxa have been recorded from the late Bajocian, which is not represented in this section. These include, *Valensiella ovula* (Deflandre, 1947) Eisenack,

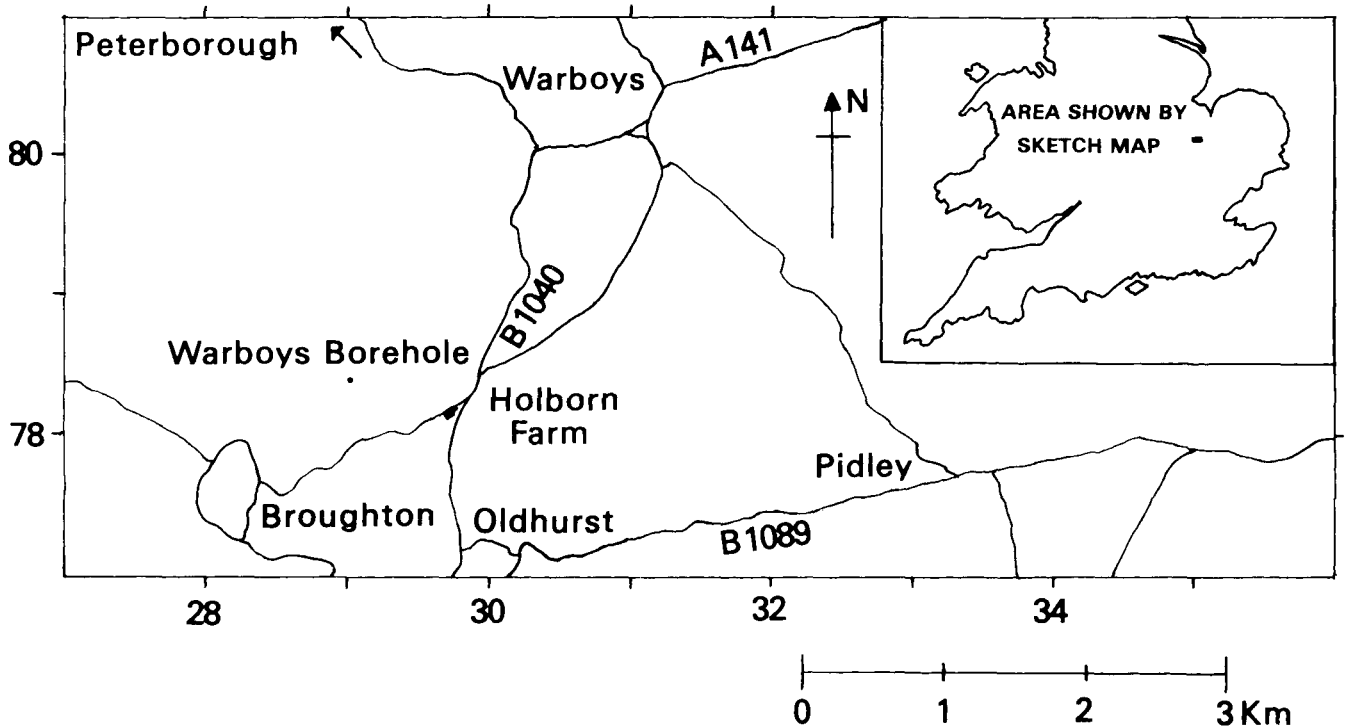


Fig. 1. Location of Warboys Borehole.

1963, *Tubotuberella eisenackii* (Deflandre, 1938) Stover & Evitt, 1978 and *Ctenidodinium sellwoodii* (Sarjeant, 1975) Stover & Evitt, 1978.

Several taxa appear in the Cornbrash (70.104m); many of these have been reported from the Bathonian (Thusu, 1978; Sarjeant, 1978). These include *Adnatosphaeridium aemulum* (Deflandre, 1938) Williams & Downie, 1969, *Adnatosphaeridium caulleryi* (De-

flandre, 1938) Williams & Downie, 1969, *Hystrichogonyaulax pectinigera* (Gocht, 1970) Stover & Evitt, 1978, *Kalyptea stegasta* (Sarjeant, 1961) Wiggins, 1975, *Mendicodinium groenlandicum* (Pocock & Sarjeant, 1972) Davey, 1979b, *Nannoceratopsis pellucida* Deflandre, 1938 and *Sentusidinium rioultii* (Sarjeant, 1968) Sarjeant & Stover, 1978.

Explanation of Plate 1

All specimens are x 700. "England Finder" co-ordinates follow the slide number for each specimen.

- Fig. 1. *Scriniodinium crystallinum* (Deflandre, 1938) Klement, 1960: MPK 3557, MPA 12053/2, C54.
 Fig. 2. *Endoscrinium* sp. Muir & Sarjeant, 1978: MPK 3558, MPA 12059/2, P32/2.
 Fig. 3. *Chytroisphaeridia cerastes* Davey, 1979a: MPK 3559, MPA 12063/2, Q57.
 Fig. 4. *Belodinium asaphum* Drugg, 1978: MPK 3560, MPA 12054/2, J57/3.
 Fig. 5. *Mendicodinium groenlandicum* (Pocock & Sarjeant, 1972) Davey, 1979b: MPK 3561, MPA 12064/2, J59.
 Fig. 6. *Hapsidaulax margarethae* Sarjeant, 1975: MPK 3562, MPA 12071/1, T59/4.
 Fig. 7. *Reulingia gochtii* Drugg, 1978: MPK 3563, MPA 12059/2, H39/3.
 Fig. 8. *Stephanelytron scarburghense* Sarjeant, 1961 emend. Stover *et al.*, 1977: MPK 3564, MPA 12056/2, Q28/2.
 Fig. 9. *Stephanelytron redcliffense* Sarjeant, 1961 emend. Stover *et al.*, 1977: MPK 3565, MPA 12059/1, B31/1.
 Fig. 10. *Dinopterygium absidatum* Drugg, 1978: MPK 3566, MPA 12056/2, K37/3.
 Fig. 11. *Adnatosphaeridium aemulum* (Deflandre, 1938) Williams & Downie, 1969: MPK 3567, MPA 12058/2, S29/3.

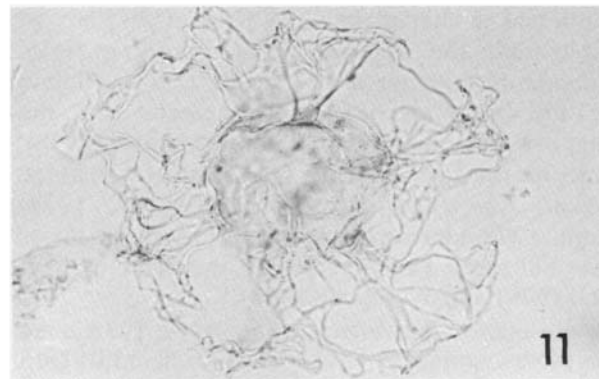
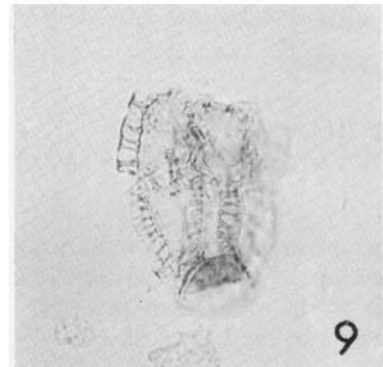
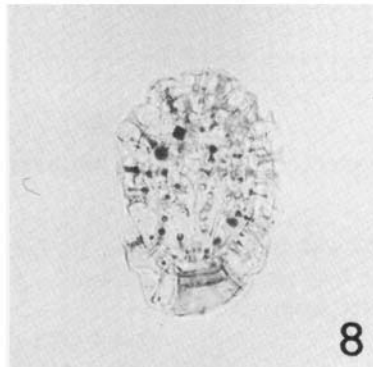
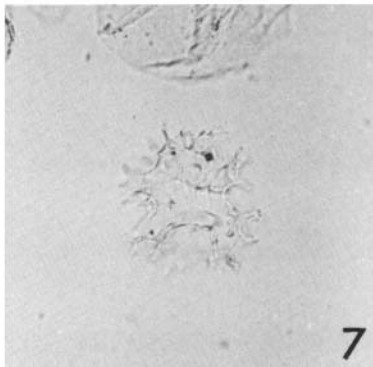
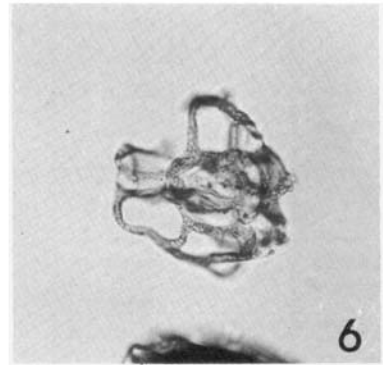
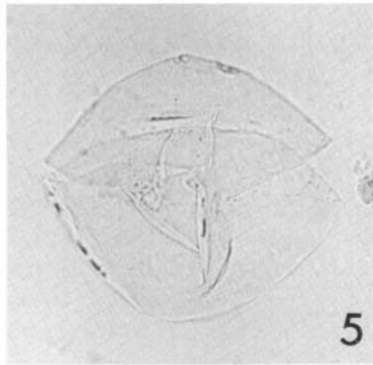
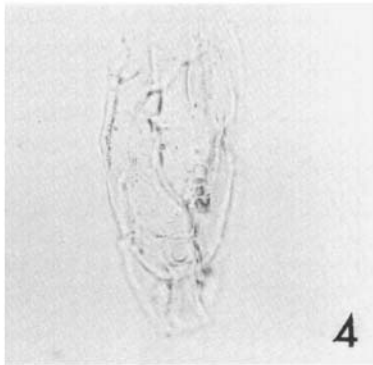
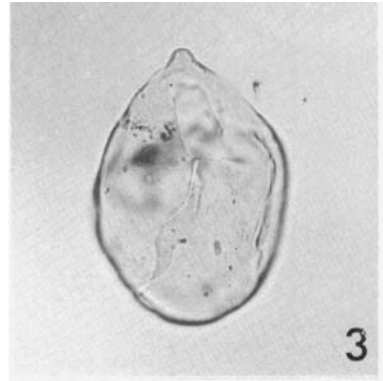
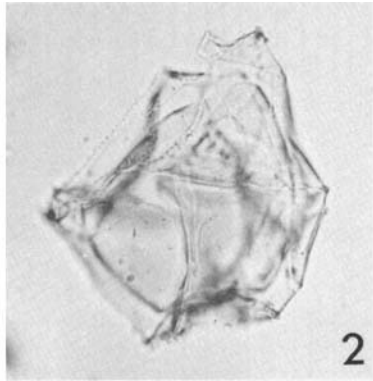
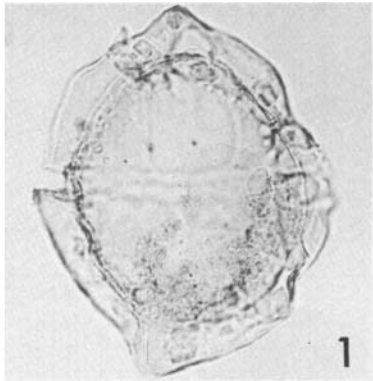


Table 1. Details of Samples

Slide Number	Depth (metres)	Lithostratigraphic Unit
MPA 12050	5.181 – 6.096	Upper Oxford Clay
12051	9.144 – 10.668	„ „ „
12052	12.192 – 13.716	„ „ „
12053	15.240 – 16.764	„ „ „
12054	18.288 – 18.313	„ „ „
12055	21.336 – 22.860	„ „ „
12056	24.384 – 24.409	Middle Oxford Clay
12057	27.432 – 28.956	„ „ „
12058	30.480 – 30.505	„ „ „
12059	33.528 – 35.052	„ „ „
12060	36.576 – 38.100	„ „ „
12061	39.624 – 41.148	„ „ „
12062	42.672 – 44.196	„ „ „
12063	45.720 – 47.244	„ „ „
12064	48.768 – 50.292	Middle Oxford Clay – to 49.225 m Lower Oxford Clay – to 50.292 m
12065	51.816 – 53.340	Lower Oxford Clay
12066	54.864 – 56.388	„ „ „
12067	57.912 – 59.436	„ „ „
12068	60.960 – 62.484	„ „ „
12069	70.104	Cornbrash
12070	73.152	Blisworth Limestone
12071	76.200	Upper Estuarine 'Series'
12072	79.248	Grantham Formation
12073	82.296	„ „
12074	85.344	„ „
12075	87.325	Upper Lias

EARLY OXFORDIAN (22.860–5.181 m.) – Two taxa are confined to the early Oxfordian; *Acanthaulax senta* Drugg, 1978 and *Wanaea fimbriata* Sarjeant, 1961. *A. senta* is known to occur in the *lamberti* Zone, uppermost Callovian in Britain (unpublished data), whereas *W. fimbriata* is confined to the early Oxfordian *mariae* and *cordatum* zones in N.W. Europe, (Sarjeant, 1961; Raynaud, 1978; Thusu, 1978; Woollam, 1980).

ACKNOWLEDGEMENTS

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REFERENCES

- (References to the taxa recognised may be found in Stover & Evitt, 1978).
- Davey, R.J. 1979a. A re-appraisal of the genus *Chytroeisphaeridia* Sarjeant 1962. *Palynology*, **3**, 209–218.
- Davey, R.J. 1979b. The stratigraphical distribution of dinocysts in the Portlandian (latest Jurassic) to Barremian (early Cretaceous) of northwest Europe. *AASP Contributions Series*, No. 5B, 49–81.
- Drugg, W.S. 1978. Some Jurassic dinoflagellate cysts from England, France and Germany. *Palaeontographica*, Cassel, Abt. B, **168**, 61–79.
- Erkmen U. & Sarjeant, W.A.S. 1980. Dinoflagellate cysts, acritarchs and tasmanitids from the uppermost Callovian of England and Scotland: with a reconsideration of the *Xanthidium pilosum* problem. *Géobios*, Lyon, **13**, 45–99.
- Fensome, R.A. 1979. Dinoflagellate cysts and acritarchs from the Middle and Upper Jurassic of Jameson Land, East Greenland. *Grønlands Geologiske Undersøgelse*. Bull. No. 132, 1–117.

- Muir, M.D. & Sarjeant, W.A.S. 1978. The palynology of the Langdale Beds (Middle Jurassic) of Yorkshire and its stratigraphical implications. *Rev. Palaeobot. Palynol.*, **25**, 193–239.
- Raynaud, J.F. 1978. Principaux dinoflagellés caractéristiques du Jurassique Supérieur d'Europe du Nord. *Palinologia*, núm. extraord, 1, 387–405.
- Sarjeant, W.A.S. 1961. Microplankton from the Kellaways Rock and Oxford Clay of Yorkshire. *Palaeontology*, London, **4**, 90–118.
- Sarjeant, W.A.S. 1975. *Hapsidaulax*, new genus of dinoflagellate cysts from the Jurassic (Bathonian) of the Isle of Skye. *Scot. J. Geol.*, **11**, 143–149.
- Sarjeant, W.A.S. 1978. A guide to the identification of Jurassic dinoflagellate cysts. *Louisiana State University, Misc. Pub.* 78–1, pp. 1–107.
- Stover, L.E. & Evitt, W.R. 1978. Analyses of Pre-Pleistocene organic-walled dinoflagellates. *Stanf. Univ. Publs.*, **15**, 1–300.
- Sylvester-Bradley, P.C. & Ford, T.D. (Eds.) 1968. *The geology of the East Midlands*, 1–400, Leicester University Press.
- Thusu, B. (Ed.), 1978. Distribution of biostratigraphically diagnostic dinoflagellate cysts and miospores from the Northwest European Continental Shelf and adjacent areas. *Continental Shelf Institute* (Trondheim), Publ. No. 100, 1–109.
- Woollam, R., 1980. Jurassic dinocysts from shallow marine deposits of the East Midlands, England. *J. Univ. Sheffield Geol. Soc.*, **7**, 243–261.