

Rotosphaeropsis thula (Davey 1982) comb. nov., emend.: a dinoflagellate cyst from the Upper Jurassic-Lower Cretaceous of England

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ABSTRACT—The Upper Jurassic-Lower Cretaceous dinoflagellate cyst *Cannosphaeropsis thula* Davey 1982 does not conform to the morphological parameters of the genus *Cannosphaeropsis* O. Wetzel 1933 emend. Duxbury 1980. The species also exhibits no indications of belonging to the *Spiniferites* complex of Evitt (1985). The species is transferred to *Rotosphaeropsis* Davey 1987 by virtue of its shape, archaeopyle type, processes and trabeculae and the specific diagnosis is emended in the light of this reassessment.

INTRODUCTION

During the course of separate palynological investigations into the Upper Jurassic and Lower Cretaceous strata of eastern England, both authors encountered large numbers of the dinoflagellate cyst *Cannosphaeropsis thula* Davey 1982. This species was previously placed in open nomenclature, as *Cannosphaeropsis* sp. A Davey 1979, and is of stratigraphical significance, ranging from the Upper Kimmeridgian (*sensu anglico*) to the Upper Ryazanian in north-west Europe (Davey, 1979; Duxbury, 1977, 1978; Riding, 1984).

The morphology of this taxon does not accord with that of the genus *Cannosphaeropsis* O. Wetzel 1933 emend. Duxbury 1980, principally because the paratabulation of *C. thula* differs markedly from that of *Spiniferites* Mantell 1850 emend. Sarjeant 1970 and also it lacks processes of *Spiniferites*-type. *Cannosphaeropsis* is a member of the *Spiniferites* complex within the informal category of Gs-cysts of Evitt (1985). The *Spiniferites* complex contains genera with widely differing morphologies, yet a distinctive series of constant features which strongly suggest a close biological relationship. The most important of these features are: trifurcate gonial and bifurcate intergonial processes (the primary furcations pointing to the centres of adjacent paraplates); a strongly sigmoidal (S-type of Evitt, 1985) parasulcus lacking intraparasulcal parasutures and normally, a single paraplate precingular archaeopyle (see Evitt, 1985 fig. 5.8B). *Cannosphaeropsis thula* Davey 1982, while sharing certain morphological features with *Cannosphaeropsis*, has a longitudinal parasulcus (L-type of Evitt, 1985 – see Figure 1 and Plate 1, fig. 1) and lacks *Spiniferites*-type processes. The purpose of this short communication is to transfer *C. thula* to *Rotosphaeropsis* Davey 1987, which is consistent with the morphology of this species, and to make certain minor emendations to the specific diagnosis.

SYSTEMATIC SECTION

Division Pyrrophyta Pascher 1914

Class Dinophyceae Fritsch 1929

Order Peridiniales Haeckel 1894

Genus *Rotosphaeropsis* Davey 1987

Type species: *Rotosphaeropsis munu* Davey 1987

Rotosphaeropsis thula (Davey 1982) comb. nov.,
emend. nov.

(Pl. 1, figs. 1–9; Figure 1)

1977 *Adnatosphaeridium apiculatum* auct. non
(Cookson & Eisenack 1960) Lentin & Williams
1973; Duxbury: 23, pl. 10, fig. 1.

1978 *Adnatosphaeridium apiculatum* (Cookson &
Eisenack 1960) Lentin & Williams 1973 *sensu*
Duxbury 1977 = *Cannosphaeropsis* sp. A of
Davey (in press); Duxbury: pl. 1, figs. 6, 7.

1979 *Cannosphaeropsis* sp. A Davey: 56, pl. 1, figs. 6,
9, 12.

1982 *Cannosphaeropsis thula* Davey: 26, pl. 8, figs.
7–11.

Emended diagnosis. A species of *Rotosphaeropsis*, ovoidal in overall shape with little, if any, dorso-ventral flattening. Cyst apparently two-layered, the two layers being closely appressed except where the periphragm alone forms the processes; cyst wall smooth to scabrate. Cyst body covered by numerous, slender, solid, parasutural processes at both gonial and intergonial positions. The processes are variable in length, from 12% to 73% of the cyst body width; they are generally longest on the hypocyst and shorter on the epicyst. The majority of the processes flare distally where they are consistently interconnected by parasutural trabeculae. The elements of the trabeculae are normally similar in

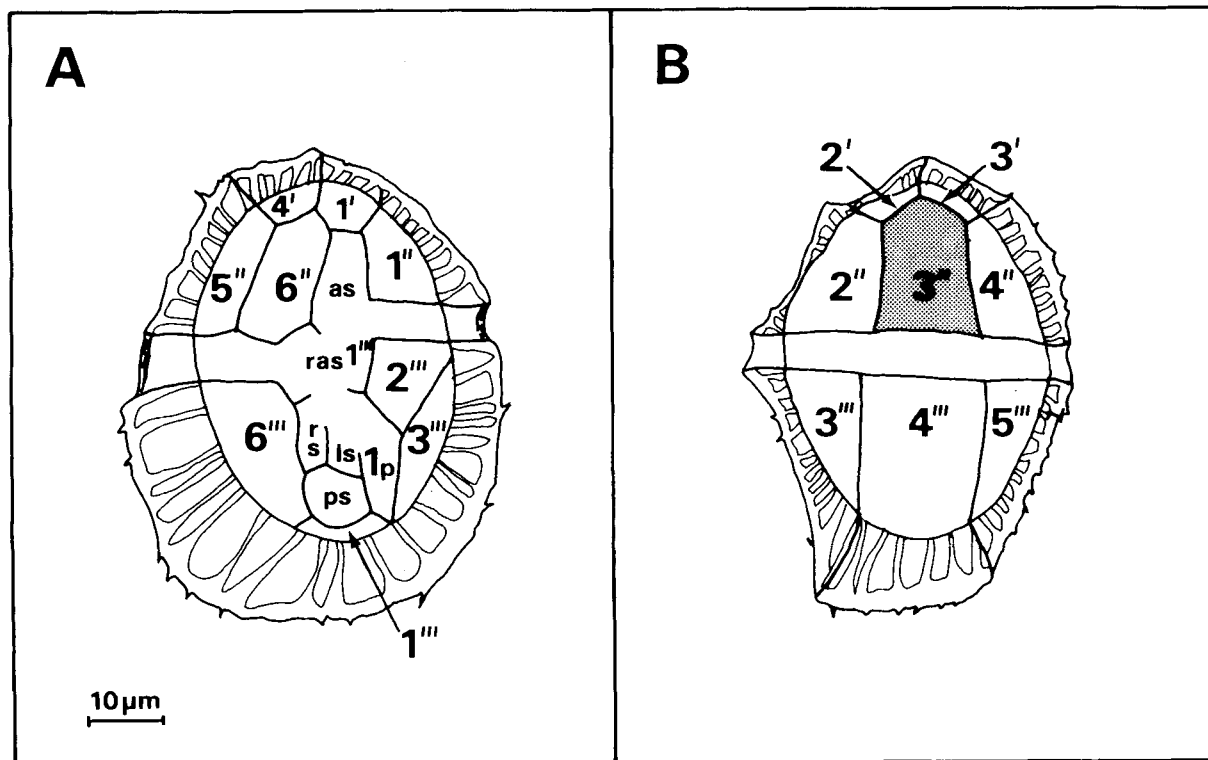


Fig. 1. Line drawing of an idealised specimen of *Rotosphaeropsis thula* (Davey 1982) comb. nov., emend. Paraplates labelled utilising Kofoidian notation. A - ventral surface. B - dorsal surface (note the archaeopyle has operated).

Explanation of Plate 1

Magnification, all figures $\times 500$. All figured material is housed in the micropalaeontological collections of the Biostratigraphy Research Group, British Geological Survey, Keyworth, Nottingham.

Figs. 1-10. *Rotosphaeropsis thula* (Davey 1982) comb. nov., emend. nov.

All specimens from the Lower Spilsby Sandstone, Beds 3 or 5 of Casey, 1973 (*Subcraspedites primitivus* Zone), Portlandian of Nettleton Top Barn, south-west of Caistor, Lincolnshire (TF 1072 9932), unless otherwise stated.

Figs. 1-3. Specimen MPK 4802. Bed No. 5. Ventral view, ventral to dorsal focus sequence. Note the longitudinal (L-type) parasulcus, well-defined paratabulation indicated by trabeculae (1) and the single paraplate precingular archaeopyle (3).

Fig. 4. MPK 2618. The holotype, dorsal view, ventral focus. Sandringham Sands (*H. kochi* Zone), Lower Ryazanian of a channel west of Abbey Station Bridge, Norfolk (TL 660 996).

Fig. 5. MPK 4804. Bed No. 3. Dorsal view and focus.

Fig. 6. MPK 4805. Bed No. 5. Dorsal view and focus. Note the prominent, type P (3''), archaeopyle which appears to be slightly enlarged posteriorly.

Fig. 7. MPK 5105. Bed No. 3. Dorsal view and focus.

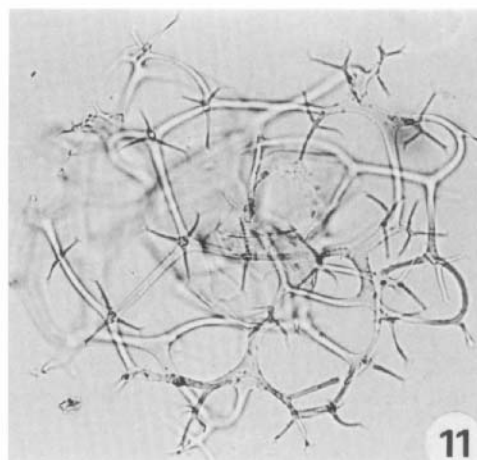
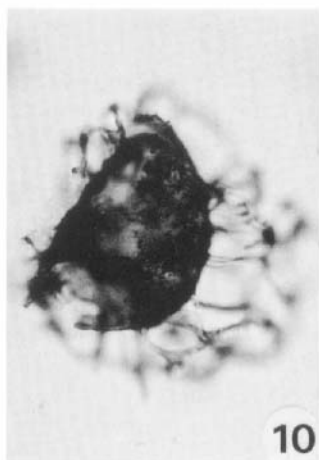
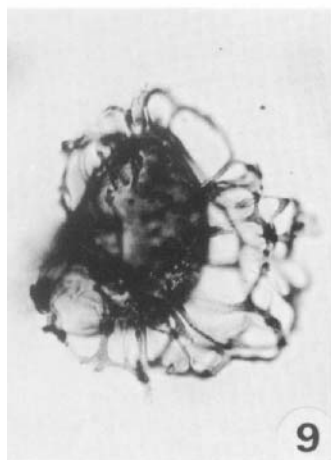
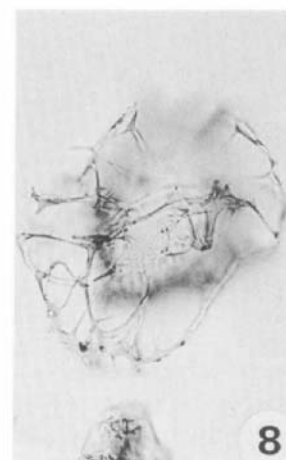
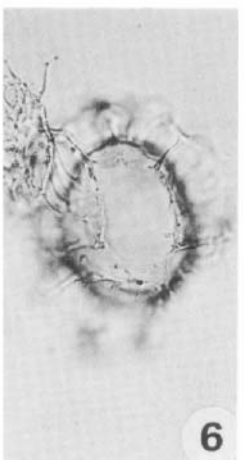
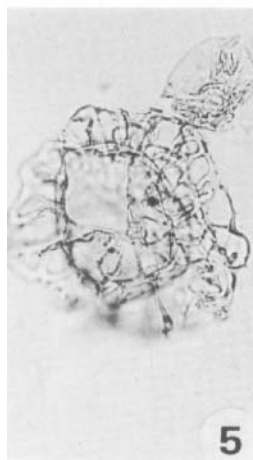
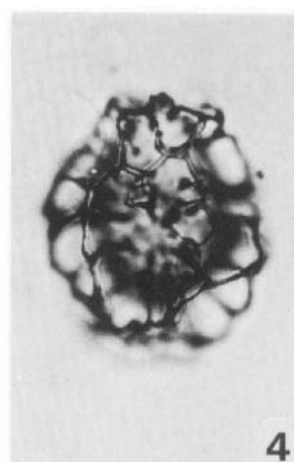
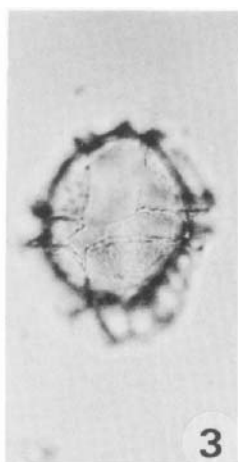
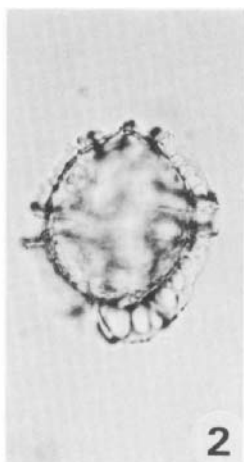
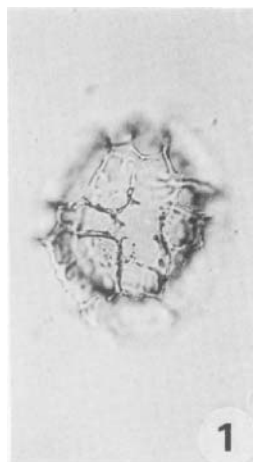
Fig. 8. MPK 4807. Bed No. 5. Oblique ventral view and focus.

Figs. 9, 10. MPK 5106. Right lateral view: 9, high focus; 10, low focus. Note archaeopyle (upper left) and relatively long processes in the ventral area (right). Lower Spilsby Sandstone, Bed 2 of Casey, 1973 (*Paracraspedites oppressus* Zone), Portlandian of Fordington No. 1 borehole, north of Spilsby, Lincolnshire (TF 416 714).

Fig. 11. *Cannosphaeropsis utinensis* O. Wetzel 1933 emend. Duxbury 1980.

MPK 5107. Figured for comparative purposes (See also Evitt, 1985 Figs. 5.8B, 5.12E-H, J, 10.7); note the prominent trabeculum which exhibits trifurcate gonial and bifurcate intergonial processes which surmount the trabeculae. Each ray of these features, which are characteristic of the *Spiniferites* complex of Evitt (1985), points to the centre of the adjacent paraplate and is bifurcate distally.

Paramoudra Chalk (Upper Chalk) - *Belemnitella mucronata* Zone - Upper Campanian of the Trunch borehole, Norfolk (TG 2933 3455).



width to the processes, but may broaden markedly and bear distally low, irregularly-spaced spines or denticles. Paratabulation sexiform gonyaulacacean, indicated by trabeculae, Kofoidian formula: 4', 6'', ?6c, 6''', 1p, 1''', 5s. Paracingular and parasulcal trabeculae are rarely discernible and the former may be partially suppressed. Parasulcus longitudinal (L-type of Evitt, 1985). Archaeopyle precingular, type P (3''), operculum free. Size, small to intermediate.

Holotype. Specimen MPK 2618, BGS slide SAL 5260/4. Sandringham Sands, *Hectoroceras kochi* Zone, Lower Ryazanian. Cut off channel, 600–700m west of Abbey Station Bridge, Norfolk, England (TL 660 996).

Dimensions. Overall cyst length: 48–84 μm . Overall cyst width: 38–72 μm . Process length: 9–28 μm .

Remarks. This species has been transferred to *Rotosphaeropsis* Davey 1987 as it exhibits distal trabeculae surmounting irregularly-spaced parasutural processes, a precingular archaeopyle and lacks *Spiniferites*-type processes. The basionym genus, *Cannosphaeropsis*, although superficially similar in terms of basic cyst organisation, shape and archaeopyle type, is inappropriate as it differs markedly in crucial details of paratabulation and morphology. *R. thula* comb. nov., emend. nov. has a longitudinal parasulcus; *Cannosphaeropsis*, by virtue of its position within the *Spiniferites* complex, has a sigmoidal ventral area. Certain topological paratabulation differences associated with L-type and S-type parasulci therefore exist between *R. thula* and *Cannosphaeropsis*, for example the former has a subparallel sided 6'' paraplate whereas the equivalent in the latter is pseudotriangular (see Evitt, 1985 fig. 5.8B). In addition, *R. thula* exhibits intraparasulcal trabeculae (Pl. 1, fig. 1), features not associated with *Spiniferites* and its allies. *Rotosphaeropsis thula* lacks the characteristic (of *Cannosphaeropsis*) triradial branches at gonial points and the paired branches located intergonally on the trabeculae (see Plate 1, fig. 10). *Cannosphaeropsis* exhibits a much reduced number of gonial processes and entirely lacks intergonal shafts, a situation differing markedly with the full complement of gonial processes together with the numerous intergonals of *R. thula*. The distally flared processes and thickened trabeculae of *R. thula* are unknown in *Cannosphaeropsis*.

The processes of *R. thula* are very variable in length. The paratabulation is readily discernible in forms with low parasutural processes although morphotypes with longer shafts tend to be distorted making the paratabulation difficult to interpret. Davey (1982) commented that the number of processes is greater in specimens from the Upper Kimmeridgian to lowermost Portlandian.

Rotosphaeropsis thula differs from *R. munu*, the type species, in that the cyst body of the former is less elongate; *R. munu* has considerably more numerous

processes, which are consistently longer than those of *R. thula*. Medial/distal cross linkage of processes, in addition to the trabeculae, are characteristic of *R. munu* but are not exhibited by *R. thula*. Because of the relatively long and complex processes of *R. munu*, the trabeculae are invariably distorted and the detailed paratabulation cannot be established.

Stratigraphical Distribution and Geographical Occurrence. The total range of *R. thula* onshore is Upper Kimmeridgian (sensu anglico), *Pectinatites huddlestoni* Zone to Upper Ryazanian, *Surites stenomphalus* Zone; it is most common (up to 5% of the dinoflagellate cyst assemblage) from the Portlandian, *Galbanites kerberus* Zone to the Lower Ryazanian, *H. kochi* Zone. *R. thula* has been reported from England and Denmark and occurs extensively in the North Sea Basin (personal observations).

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