Journal of Micropalaeontology, **17**: 173–178. 0262-821X/98 $10.00 © 1998 British Micropalaeontological Society.

Odontochitina tabulata sp. nov. A Late Santonian–Early Campanian dinoflagellate cyst from SE Sirte Basin, Libya

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ABSTRACT – *Odontochitina tabulata*, a new tabulated ceratioid species, has been recorded and described from core samples in Well C3-65 in the SE Sirte Basin. This species is characterizd by parasutural and pandasutural features reflecting clear gonyaulacacean paratabulation. It has a short stratigraphic range and is considered as a valuable stratigraphic marker for the Late Santonian–Early Campanian. The diagnosis of the genus *Odontochitina* Deflandre, 1935 is emended to include forms having a well defined gonyaulacacean paratabulation and narrow pandasutural and parasutural ridges. *J. Micropaleontol.* **17**(2): 173–178, December 1998.

INTRODUCTION

The presented taxon is one of many new genera and species recovered by the author during a study of the Upper Cretaceous sediments subcropping in the SE Sirte Basin, Libya. The new taxon is recovered from the Upper Cretaceous succession of Well C3-65 in the Sarir area, SE Sirte Basin (Fig. 1). This well belongs to the Arabian Gulf Oil Company (AGOCO) Libya and was drilled by British Petroleum (BP) in 1961, and six cores were cut in the Upper Cretaceous sediments. These cores are barren of any age diagnostic foraminifera. The palynological analyses of these cores have yielded a richassemblage of diverse and well preserved palynomorphs. The newly recorded taxa include many peridinioid and gonyaulacoid species. The latter includes a distinctive tabulated ceratioid species of the genus *Odontochitina* Deflandre, 1935, emend. nov., identified as *O. tabulata* sp. nov. This species is recorded from three successive samples from core # 4 (depths 8517 feet, 8520–8523 feet, 8524–8527 feet) which have been assigned to a Late Santonian-Early Campanian age by the author. This age interpretation is based on the presence of stratigraphically important species such as *Nelsoniella aceras* Cookson & Eisenack, 1960, *N. tuberculata* Cookson & Eisenack, 1960, *Eucladinium* cf. *gambangense* (Cookson & Eisenack, 1970) Stover & Evitt, 1978, *E. madurense* (Cookson & Eisenack, 1970) Stover & Evitt, 1978, *Exochosphaeridium bifidium* (Clarke & Verdier, 1967) Clarke *et al.*, 1968, *Nematosphaeropsis grande* Davey, 1975. The detailed palynostratigraphy of these samples is under preparation by the author to be published in a separate paper.

Material

The samples were treated with standard palynological techniques, including a treatment with HCL (35%), HF (40%) and oxidation with Schultze solution. Strong oxidation is used to liberate the palynomorphs which are locked up inside the organic material. They are then stained using Safranin-0 to make them more visible. All type slides are housed in the palynological collection of the Centre for Palynological Studies, Sheffield University, England.

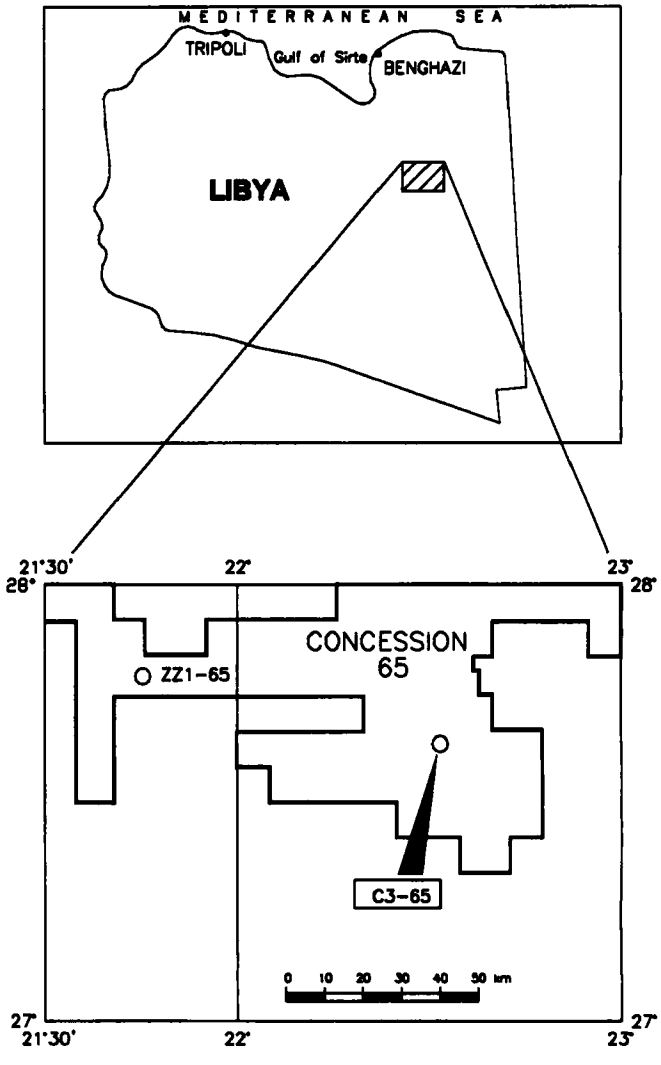


Fig. 1. Location map of the Well C3-65.

SYSTEMATIC PALYNOLOGY

Division ***Dinoflagellata*** (Bütschli, 1885) Fensome *et al.*, 1993
Subdivision ***Dinokaryota*** Fensome *et al.*, 1993
Class ***Dinophyceae*** Pascher, 1914
Subclass ***Peridiniphycidae*** Fensome *et al.*, 1993
Order ***Gonyaulacales*** Taylor, 1980
Suborder ***Ceratiineae*** Fensome *et al.*, 1993
Family ***Ceratiaceae*** Willey & Hickson, 1909

Genus ***Odontochitina*** Deflandre, 1935 emend. nov.

1935 *Odontochitina* Deflandre: 234.

1970 *Odontochitina* Deflandre emend. Davey: 354.

1986 *Odontochitina* Deflandre emend. Davey emend Bint: 138.

Type species. *Odontochitina operculata* (Wetzel, 1933) Deflandre & Cookson, 1955.

Emended description

Cyst type. Ceratioid, cornucavate to bicavate.

Shape. Pericyst outline ceratioid with three prominent horns, one apical, one antapical and one lateral postcingular in position; horns are hollow, with rounded, pointed or open tips; endocyst subspherical to ovoidal.

Wall relationships. Cyst cornucavate to bicavate; pericoels usually restricted to the bases of horns (cornucavate), or the antapical and lateral margins; connections between lateral pericoel (at base of the lateral horn) and antapical pericoel (at base of the antapical horn) do occur.

Wall features. Parasutural and pandasutural features are indicated by faint to low ridges; periphragm thin, smooth to scabrate, very rarely bearing echinae, short spines or perforations, with three well developed unequal horns. Apical, antapical and postcingular lateral horns, smooth, perforated or with low relief features, straight or recurved, and with pointed, expanded or truncated ends. Endophragm thicker than the periphragm; smooth, scabrate or granulate sometimes with small rounded nipple-like protrusion, due to the protrusion of the endophragm into the base of the apical and antapical horns (Pl. 1 fig. 1; Pl. 2, fig. 6).

Paratabulation. Indicated either by the archeopyle and rarely by paracingulum, parasutural features, or by pandasutural features; paratabulation formula: 4′, 6″, 5-6c, 6‴, 1p, 1⁗, Xs.

Archeopyle. Apical, type [tA], principle archeopyle parasuture smooth, weakly angular to zigzag with an offset parasulcal notch; operculum free or attached.

Paracingulum. If present indicated by faint features or by low relief parasutural ridges.

Parasulcus. Indicated anteriorally by an offset parasulcal notch, or by two parallel longitudinal parasutural ridges in the ventral side of the hypocyst.

Remarks and comparison. *Odontochitina* Deflandre; emended herein closely resembles *Xenascus* Cookson & Eisenack, 1969 emend. Stover & Helby (1987), as both have a ceratioid cyst. The latter differs from *Odontochitina* in having a circumcavate to a cornucavate cyst with variable, large periphragmal processes, whereas the former has a cornucavate to bicavate cyst with very rarely homogeneous, small, closed, spinose processes.

Pseudoceratium Gocht; 1957 emend. Stover & Helby (1987) also resembles *Odontochitina* but differs in having a circumcavate cyst with shorter horns and greater ornamentation.

Discussion. This genus is emended to include species with a cornucavate, and occasionally an epicavate, tabulate cyst in which the paratabulation is defined by parasutural features.

Odontochitina tabulata sp. nov.

(Pl. 1, figs 1–8; Pl. 2, figs 1–6; Fig. 2)

Holotype. Well C3-65, core # 4, 8520-8523 feet; slide 7(ox). England Finder reference P34/0. Pl. 1, fig. 2; Fig. 2b.

Paratype. Well C3-65, core # 4, 8520-8523 feet; slide 7(ox). England Finder reference P44/4. Pl. 1, fig. 1.

Type locality. AGOCO Well C3-65, core # 4, 8520-8523 feet.

Diagnosis. Ceratioid cyst, cornucavate to occasionally epicavate; endocyst ovoidal to subspherical, lenticular in shape with apical, antapical and lateral horns of unequal size. Distal extremities are pointed, closed or open. The lateral horn is dagger-shaped. The cyst has a paratabulation reflected by the paracingulum and well developed pandasutural and parasutural ridges. Ridges low, smooth and thin, with smooth or serrate margins. Apical archeopyle, type [tA], operculum free; paracingulum and parasulcus are indicated by parasutural ridges. Paratabulation formula, 4′, 6″ 5–6c, 6‴, 1p, 1⁗, Xs.

Description.

Cyst type. Ceratioid, cornucavate, occasionally epicavate.

Shape. Pericyst ceratioidal in outline; ventro-dorsally or laterally compressed. Endocyst ovoidal to subspherical, lenticular, with straight or convex sides but the right lateral margin below the lateral horn is usually convex. Three pointed or truncated (probably by mechanical breakage), short ($< 50\,\mu m$) to long ($> 50\,\mu m$) horns are present. The lateral horn is postcingular and dagger-shaped being recurved to some degree towards the antapex. It possesses a paracingular notch at the point of recurvature. Both the apical and antapical horns are straight or slightly recurved to a small degree. This recurvature is more prominent at the mid-length of the antapical horn.

Wall relationships. Cornucavate to epicavate, with thick, smooth endophragm and thin, smooth to scabrate periphragm, separated from each other at the bases of the three horns. Antapical and lateral pericoels do occur, sometimes in connection with each other.

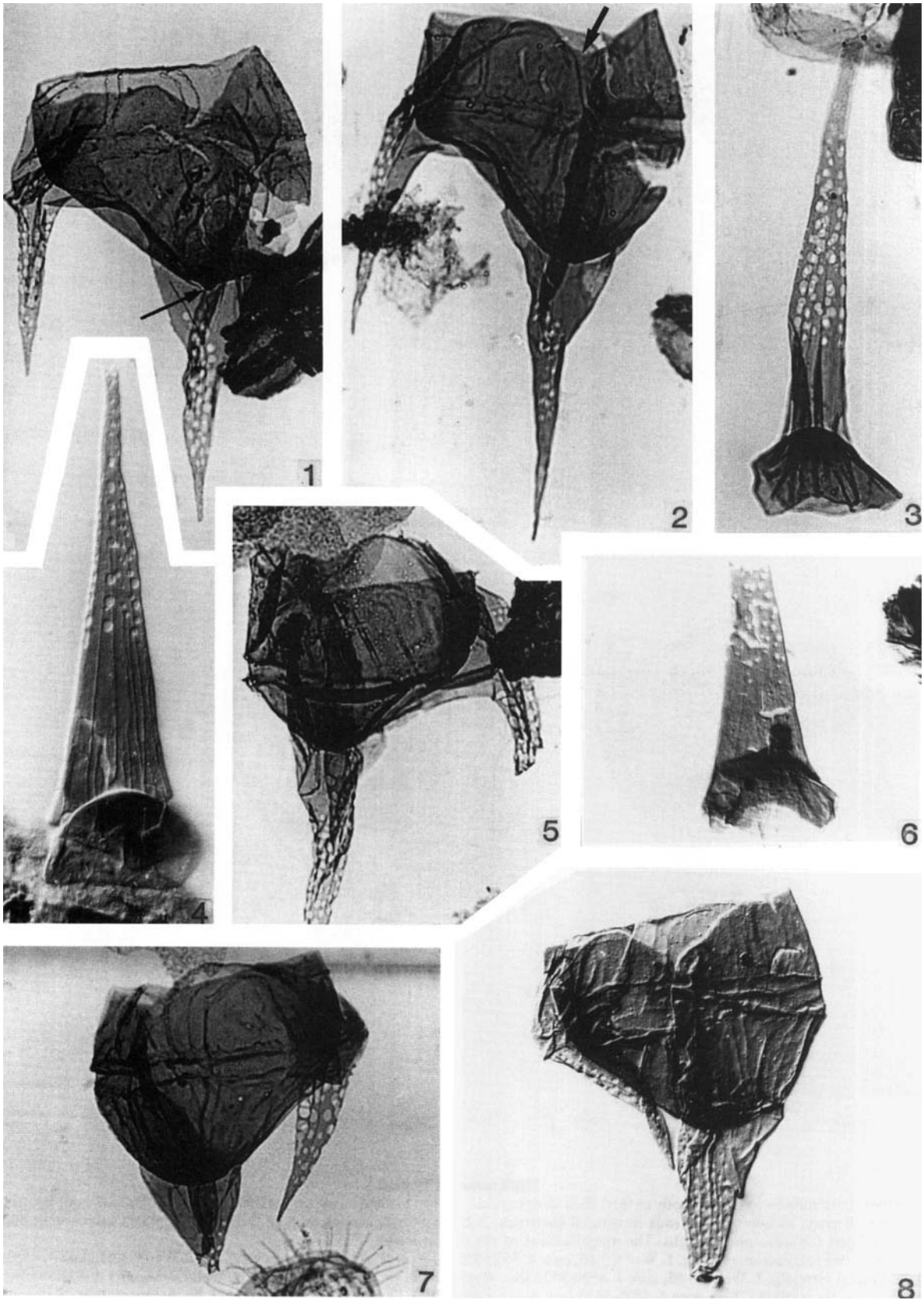
Wall features. Periphragm thin, smooth, with continuous narrow pandasutural and parasutural ridges with low relief and smooth to serrate crests; accessory parallel ridges are developed across the apical, antapical and lateral horns. The endophragm is smooth, sometimes with a small rounded nipple-like protrusion which is due to the protrusion of the endophragm into the base of the apical and antapical horns

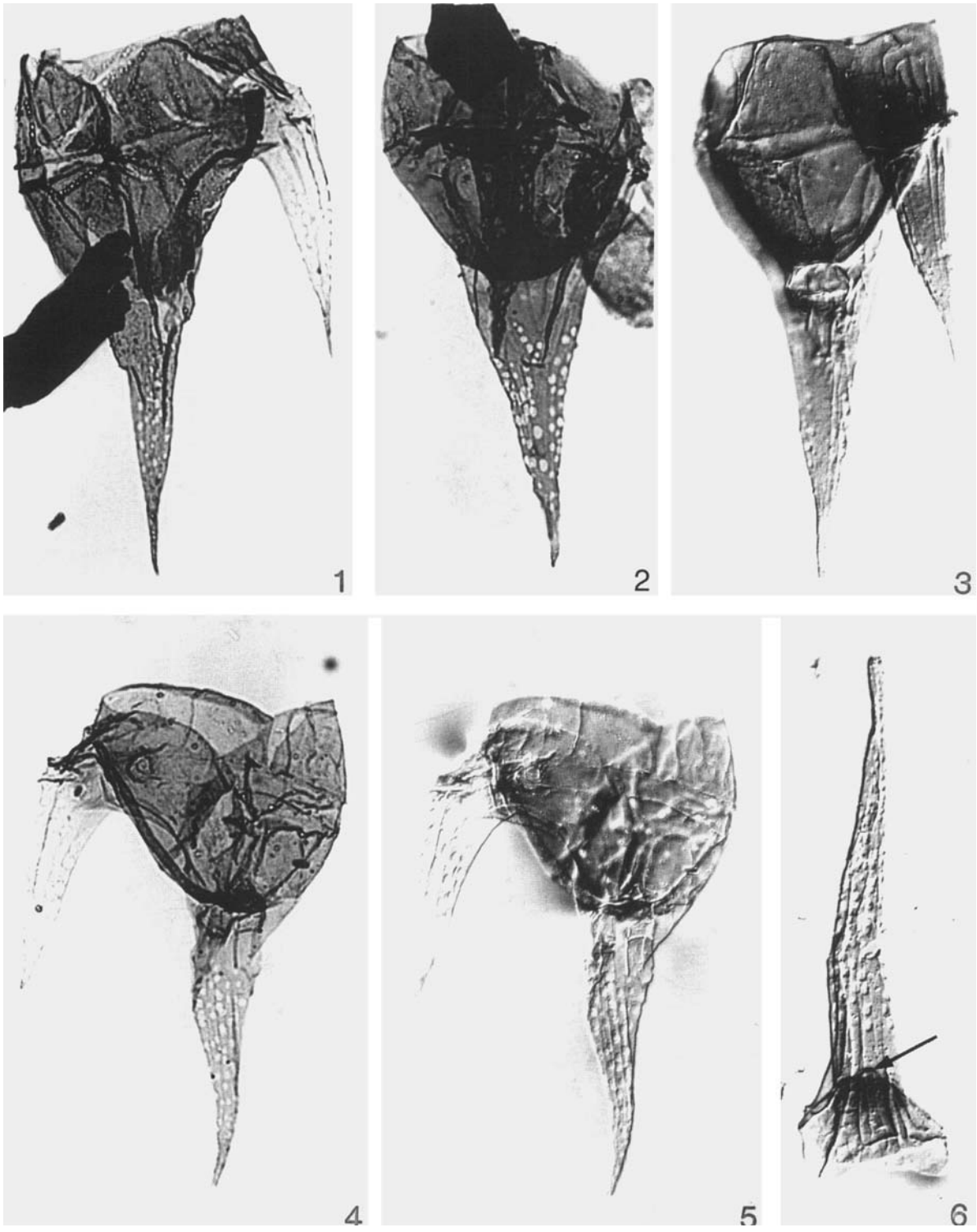
Explanation of Plate 1

The well number, core number, sample depth in feet, slide designation (ox) for oxidized samples and (unox) for unoxidized samples, and England Finder reference all given sequentially for each illustrated specimen. A Leitz 2 Orthplan microscope fitted with nomaski interference contrast (IC) illumination was used for some photographs. The magnification of the taxa is ×600.

figs 1–8. *Odontochitina tabulata* sp. nov. **fig. 1.** Paratype, Well C3-65, core 4, 8520-8523 feet, 7(ox), P44/4. Ventral view. Note the antapical nipple at the antapex of the endocyst (arrow). **fig. 2.** Holotype, Well C3-65, core 4, 8520-8523 feet, 7(ox), P34/0. Ventral view. Note the parasulcal notch (arrow). **fig. 3.** Operculum. Well C3-65, core 4, 8520-8523 feet, 7(ox), P47/1. **fig. 4.** Operculum. Well C3-65, core 4, 8520-8523 feet, 5(ox), T46/4, (IC). **fig. 5.** Well C3-65, core 4, 8520-8523 feet, 8(ox), K55/5. Intermediate focus. **fig. 6.** Operculum. Well C3-65, core 4, 8520-8523 feet, 4(ox), J40/4, (IC). **fig. 7.** Well C3-65, core 4, 8520-8523 feet, 5(ox), X38/1. Dorsal view. **fig. 8.** Well C3-65, core 4, 8520-8523 feet, 8(ox), C40/2, (IC). Dorsal view (transparency).

Odontochitina tabulata sp. nov.





Explanation of Plate 2

The well number, core number, sample depth in feet, slide designation (ox) for oxidized samples and (unox) for unoxidized samples, and England Finder reference all given sequentially for each illustrated specimen. A Leitz 2 Orthplan microscope fitted with nomaski interference contrast (IC) illumination was used for some photographs. The magnification of the taxa is ×600.

figs 1–6. *Odontochitina tabulata* sp. nov. **fig. 1.** Well C3-65, core 4, 8520-8523 feet, 8(ox), C48/4. Dorsal view. **fig. 2.** Well C3-65, core 4, 8520-8523 feet, 4(ox), Y46/2. Lateral view. **fig. 3.** Well C3-65, core 4, 8520-8523 feet, 4(ox), E33/0, (IC). Dorsal view. **fig. 4.** Well C3-65, core 4, 8520-8523 feet, 4(ox), F45/3. Ventral view. **fig. 5.** Well C3-65, core 4, 8520-8523 feet, 4(ox), F45/3, (IC). Dorsal view (transparency). **fig. 6.** Operculum, Well C3-65, core 4, 8520-8523 feet, 4(ox), F39/0, (IC). Note the apical nipple at the apex of the endo-operculum (arrow).

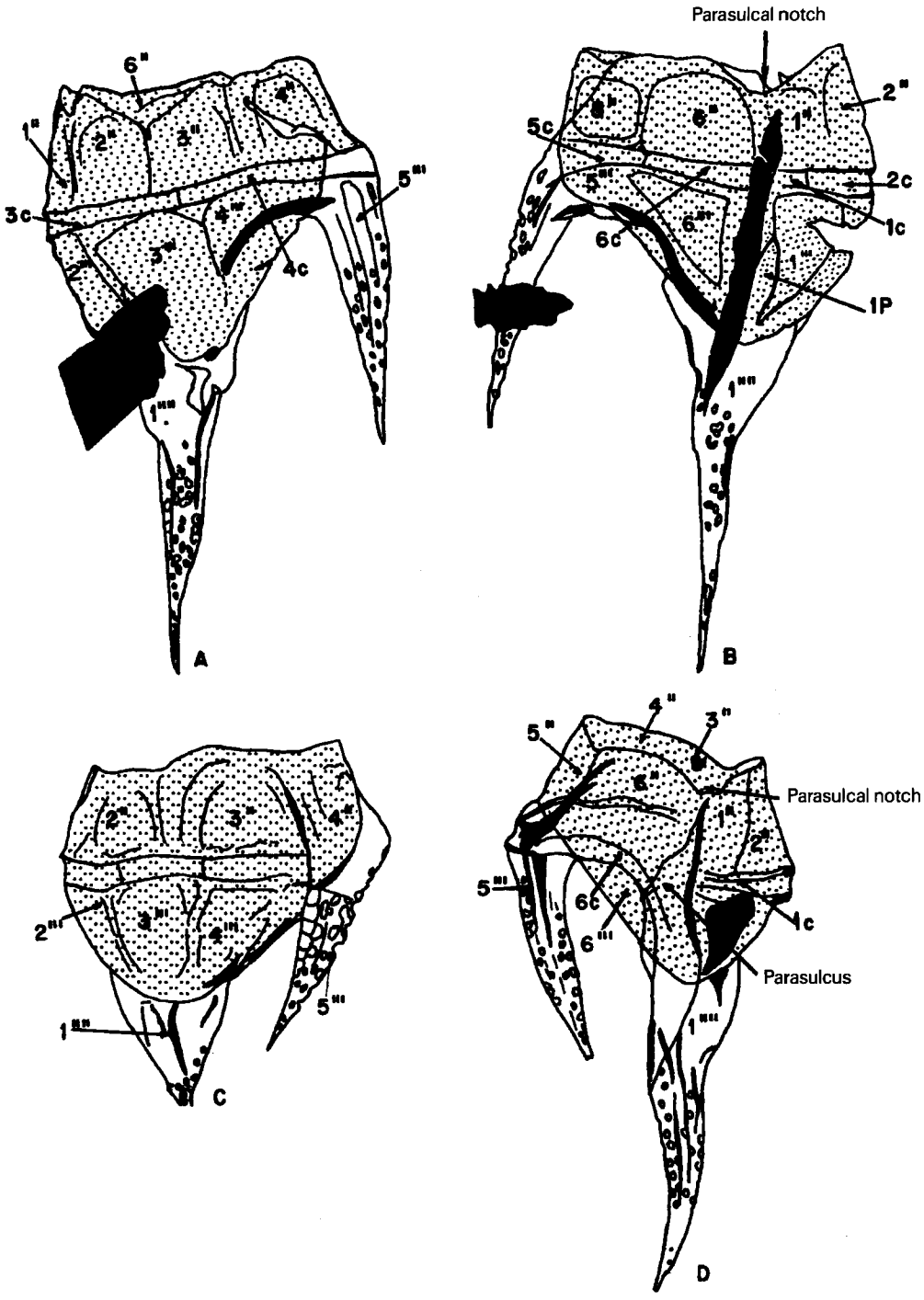


Fig. 2. Paratabulation and pericyst–endocyst outline of *Odontochitina tabulata* sp. nov. A & C, dorsal view; B & D, ventral view. B, holotype.

(Pl. 1, fig. 1; Pl. 2, fig. 6). The periphragm is smooth to scabrate. About 2/3 of the distal part of the apical, antapical and lateral horns are ornamented with numerous perforations which are aligned alongside the ridges on the horns. These perforations are subcircular to subrectangular and < 0.5 m to > 3 m in diameter.

Paratabulation. Gonyaulacacean, normally indicated by parasutural ridges, archeopyle and paracingulum. The derived paratabulation formula is 4′, 6″, 5–6c, 6‴, 1p, 1‴″, Xs.

Archeopyle. Apical, type [tA], principal archeopyle parasuture smooth or zigzag with slightly offset parasulcal notch; operculum free.

Paracingulum. Distinct and delineated by shallow transverse depression and two parallel parasutural ridges which may also indicate the presence of 5–6 paraplates. Paracingular notch is

always present at the point of re-curvature of the lateral horn.

Parasulcus. Delimited by parasutural features and shallow longitudinal depression on the mid-ventral surface of the hypocyst and on the anterior part of the epicyst by the parasulcal notch.

Dimensions. Overall length (without apical horn) 210 (265) 320 μm; endocyst length 54 (64) 74 μm, width 42 (54) 74 μm; apical horn length 100 (104) 108 μm; antapical horn length 40 (62) 82 μm; lateral horn length 34 (57) 80 μm; specimens measured 19. Dimensions of holotype; overall length (without apical horn) 250 μm; endocyst length 74 μm, width 72 μm; antapical horn length 76 μm; lateral horn length 60 μm. Dimension of paratype; overall length (without apical horn) 210 μm; endocyst length 64 μm, width 70 μm; antapical horn length 62 μm; lateral horn length μ34 m.

Remarks. *Odontochitina tabulata* sp. nov. a species of *Odontochitina* Deflandre, 1935 emend., is characterized by possessing pandasutural and parasutural ridges reflecting clear gonyaulacacean paratabulation. *Odontochitina tabulata* sp. nov. is similar to *O. cribropoda* Deflandre & Cookson, 1955 and *O. porifera* Cookson, 1956 in the general morphology, but the former differs from the two latter species in having paratabulation reflected by panda- and parasutural features, which the latter species are lacking. The new species also differs from *O. porifera* in that the perforations are restricted to the 2/3 of the distal part of the apical, lateral and antapical horns.

Stratigraphic occurrence. Late Cretaceous (Late Santonian–Early Campanian), Well C3-65, core # 4, sample numbers 34, 35 & 36 (depths 8517–8521 feet, 8520–8523 feet, 8524–8527 feet).

ACKNOWLEDGEMENTS

The author thanks Dr E. Spinner and Dr D. Jolley for their help and support throughout the period of his research at the Centre for Palynological Studies, Sheffield University, England. My sincere thanks goes to Mr A. Asbali, the manager of the Exploration Division, Arabian Gulf Oil Company (AGOCO) for the permission to publish this paper.

Manuscript received December 1997
Manuscript accepted August 1998

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