Phytoplankton from the Upper Cretaceous Quiriquina Formation, central Chile

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Introduction

The materials investigated were provided by Prof. S. Maeda, Geological Institute, Faculty of Science, Chiba University, who collected from the Upper Cretaceous Quiriquina Formation being distributed in Quiriquina Island and Tumbes Peninsula, central Chile.

The author (1977) already described forty-two miospores from the Upper Cretaceous Quiriquina Formation in Quiriquina Island. In this paper, he describes seven phytoplanktonic forms from the Quiriquina Formation in Quiriquina Island.

Acknowledgements

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Materials and fossil phytoplankton

The samples from the Quiriquina Formation of Quiriquina Island and Tumes Peninsula were examined. The material from Quiriquina Island is a dark gray mudstone and the Tumbes Peninsula material is a greenish mudstone containing many molluscan fossils.

The materials were processed by mechanical and chemical methods (maceration by KClO₃ and conc. HNO₃, treatment by 15% KOH and then by HF, centrifuging and washing in pure water after each step). The residues were mounted in glycerine jelly. All slides were sealed with a mixture of solid paraffin and
Text-fig. 1. Locality map showing situation of the Island of Quiriquina.
1: Metamorphic complex
2: Quiriquina Formation

Canada balsam.

All phytoplanktonic forms examined in this paper are from Quiriquina Island and as follows.

Dinophyceae
Deflandreaceae
Deflandrea quiriquinaensis n. sp.
Spiniferitaceae
Spiniferites cf. ramosus (Ehrenberg) Mantell
Spiniferites sp.

Acritarcha
Acanthomorphitae
Baltisphaeridium sp.
Micrhystridium piliferum Deflandre
**Micrhystridium deflandrei Valensi**

*Sphaeromorphitae*

*Leiosphaeridia* sp.

All specimens illustrated in this paper and the sample from which they were obtained are in the palynological collection of the Department of Geology, Nagasaki University.

**Systematic descriptions**

Class Dinophyceae *Pascher*, 1914.

Order Peridiniales *Schutt*, 1896.


Genus *Deflandrea* *Eisenack* 1938.

*Deflandrea quiriquinaensis* n. sp.

Pl. 1, figs. 1-3.

**Description:** Outer cyst large, more or less pentagonal in dorso-ventral view; length 75-100.2 μ overall; width 63-79.7 μ; outer cyst membrane smooth to irregularly granulate or punctate. Apical horn more than 10-17.5 μ in length; antapical horns more than 25-30 μ in length with left horn slightly longer than the right one; antapical horns tend to slightly diverge from each other. Inner cyst completely fills the outer one. Girdle wall developed by ridges, about 6-6.6 μ in width. Furrow about 10-20 μ wide and is bordered by more or less frilled border. Intercalary archeopyle large, usually outlines by a lateral oval in form.

**Holotype:** Pl. 1, figs. 1a-c; grain size—outer cyst 100.2 x 79.7 μ, inner cyst 58.8 x 76.3 μ; apical horn more than 17.5 μ in length; antapical horns more than 30 μ in length; girdle about 6.3 μ in width; slide GN 2418.

**Occurrence:** Few, Quiriquina Formation, Quiriquina Island, Chile.

**Remarks:** The present specimens are differentiated from *Deflandrea dilwynensis* *Cookson* & *Eisenack* from the Paleocene Pebble Point Formation, SW Victoria, Australia, by its larger size, its longer antapical horns, and a laterally oval form of archeopyle.


Type species: Spiniferites ramosus (Ehrenberg 1838) Mantell 1854.

Spiniferites cf. ramosus (Ehrenberg) Mantell

Pl. 1, figs. 4a-b.

1933. Hystrichosphaera ramosa (Ehrenberg) Wetzel, Palaeontographica, A, 77, p. 35, pl. 5, figs. 7-8, 10-12, 18-19.

Dimensions: Diameter of central body 32.7 x 26.5 µ; length of processes 7-8 µ; archeopyle — plate area 3''.

Occurrence: Very rare, Quiriquina Formation, Quiriquina Island, Chile.

Remarks: Only one specimen was found. The present specimen which is a smaller form is presumably refereable to Spiniferites ramosus (Ehrenberg) Mantell.

Spiniferites sp.

Pl. 1, fig. 5.

Description: Test ovoid. Test wall thin, punctate. The plate areas are defined by distinct sutural septa and are completely developed in number and arrangement. Processes at corners of plate areas longer, either bifurcate or trifurcate. Archeopyle is developed from plate area 3''.

Dimensions: Test 70 x 52.5 µ; length of process 12.5-25 µ.

Occurrence: Very rare, Quiriquina Formation, Quiriquina Island, Chile.

Remarks: Only one specimen was found. This specimen is superficially similar to Spiniferites (al. Hystrichosphaera) bentori (Rossignol) in form and dimensions.

Incertae sedis

Group Acritarcha Evitt 1963.


Type species: Baltisphaeridium longispinosum (Eisenack 1931) Eisenack 1958.

Baltisphaeridium sp.

Pl. 1, figs. 6a-b.

Description: The test is spherical, smooth thin-walled, bearing numerous spines.
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The spines are simple, straight, and curved or flexible hair-like, 7μ long. No archeopyle has been observed. Central body 23.4μ in diameter.

**Occurrence:** Very rare, Quiriquina Formation, Quiriquina Island, Chile.

**Remarks:** Only one specimen was found. In the absence of any pylom, this form is placed in the genus *Baltisphaeridium*.

**Genus Micrhystridium Deflandre 1937 emend. Downie & Sarjeant 1963.**

*Type species: Micrhystridium inconspicuum (Deflandre 1935) Deflandre 1937.*

*Micrhystridium piliferum Deflandre*

Pl. 1, fig. 7.

1937. *Micrhystridium piliferum* Deflandre, Ann. Paleont., 26, 80–81, pi. 15, fig. 11.

**Dimensions:** Grain size 9.7μ in diameter; test wall 0.7μ thick; length of spine 1.9–3.1μ.

**Occurrence:** Very rare, Quiriquina Formation, Quiriquina Island, Chile.

**Remarks:** Only one specimen was found. This specimen is smaller than Deflandre's original specimen, but coincides with Davey's specimens (1970, pl. 7, figs. 3, 4; figs. I F, G).

*Micrhystridium deflandrei Valensi*

Pl. 1, figs. 8–9.


**Dimensions:** Grain size 12–13μ; length of spines 0.6μ.

**Occurrence:** Rare, Quiriquina Formation, Quiriquina Island, Chile.

**Remarks:** The present specimens are identified with *Micrhystridium deflandrei* Valensi from the Middle Jurassic (Bathonian) of France.

Subgroup Sphaeromorphitae Downie, Evitt, and Sarjeant 1963.

**Genus Leiosphaeridia Eisenack 1958 emend. Downie and Sarjeant 1963.**

*Type species: Leiosphaeridia baltica Eisenack 1958.*

*Leiosphaeridia sp.*

Pl. 1, fig. 10.

**Description:** The shell is spherical, smooth, and thick-walled. The wall is 3μ
thick (inner wall $0.9 \mu$ thick, outer wall $3.4 \mu$ thick). Grain size $34.2 \mu$ in diameter.

**Occurrence:** Very rare, Quiriquina Formation, Quiriquina Island, Chile.

**Remarks:** Only one specimen was found. This specimen is similar to *Leiosphaeridia pusilla* Mägler (1963, p. 348, pl. 25, figs. 10-13), but differs from the latter in having smaller size and thicker wall.

**References**


Explanation of Plate 1

Figs. 1–3. *Deflandrea quiriquinaensis* n. sp.
Figs. 1a–c: holotype, slide GN 2418 (figs. 1a–b X 600, fig. 1c X 400); figs. 2a–b: slide GN 2414 (X 600); fig. 3: slide 2420 (X 400).

Figs. 4a–b. *Spiniferites cf. ramosus* (Ehrenberg) Mantell
Figs. 4a–b: slide GN 2412 (X 1000).

Fig. 5. *Spiniferites sp.*
Slide GN 2415 (X 400).

Figs. 6a–b. *Baltisphaeridium sp.*
Slide GN 2412 (X 1000).

Fig. 7. *Micrhystridium piliferum* Deflandre
Slide GN 2417 (X 1000).

Figs. 8–9. *Micrhystridium deflandrei* Valensi
Fig. 8: slide GN 2411 (X 1000); fig. 9: slide GN 2411 (X 1000).

Fig. 10. *Leiosphaeridia sp.*
slide GN 2415 (X 1000).