

# Two new heterococcoliths from the Albian–Cenomanian, Austral Basin, Patagonia, Argentina

Juan Pablo Pérez Panera

CONICET. División Paleozoología Invertebrados, Museo de La Plata, Paseo del Bosque s/n, B1900FWA, La Plata, Argentina.  
perezpanera@gmail.com / jperezpanera@conicet.gov.ar

Manuscript Received 19th September, 2011; Manuscript Accepted 23rd April, 2012.

**Abstract** Two new heterococcoliths, *Zeughrabdotus angelozziae* sp. nov. and *Cribrosphaerella santacruzensis* sp. nov. are described and illustrated. The species were recovered from drill samples from two boreholes in Albian to Cenomanian sediments from the high southern latitude Austral Basin, Argentina.

**Keywords** Calcareous nannofossils, *Zeughrabdotus angelozziae*, *Cribrosphaerella santacruzensis*, Cretaceous, Austral Basin, Argentina.

## 1. Introduction

Calcareous nannofossil biostratigraphic investigations of Cretaceous sediments within the high southern latitude Austral Basin, Argentina (Pérez Panera, in press) have revealed at least two new heterococcoliths. These are described herein as *Zeughrabdotus angelozziae* and *Cribrosphaerella santacruzensis*. Although both species are represented in low numbers within the calcareous nannofossil assemblages, they may have some local biostratigraphic significance. High-latitude calcareous nannofossil associations such as those in this study are typically of lower diversity compared to those of low-latitudes, so the identification of new, local biostratigraphic events, may have potential for developing a local biozonation. This may impact stratigraphic understanding as it pertains to oil exploration in the area. These new species were recorded in Albian to Cenomanian drill samples provided by Petrobras-Energía S.A. from Sur Río Chico and Cañadón Salto boreholes. The exact names of the boreholes and their geographic coordinates are held in confidence by the petroleum company; however, Figure 1 illustrates their general locations within the Austral Basin.

## 2. Materials and Methods

Drill samples were prepared according to the gravity settling technique of Bramlette & Sullivan (1961). A petrographic microscope with polarized light at a magnification of 1200X was used for analysis. All slides were deposited in the Facultad de Ciencias Exactas y Naturales of the Universidad Nacional de Buenos Aires collection (BAFC-NP). The taxonomic scheme adopted in this study is based on the

systematic revision and taxonomic criteria proposed by Jordan & Kleijne (1994), Young & Bown (1997a; 1997b) and Bown & Young (1997).

## 3. Systematic Palaeontology

Order Eiffellithales Rood, Hay & Barnard, 1971

Family Chiastozygaceae Rood, Hay & Barnard, 1971  
emend. Varol & Girgis, 1994

Genus *Zeughrabdotus* Reinhardt, 1965 emend.  
Black, 1973



Figure 1. Location map of Sur Río Chico and Cañadón Salto boreholes in the Austral Basin, Argentina (map modified after Nulló *et al.*, 1999).

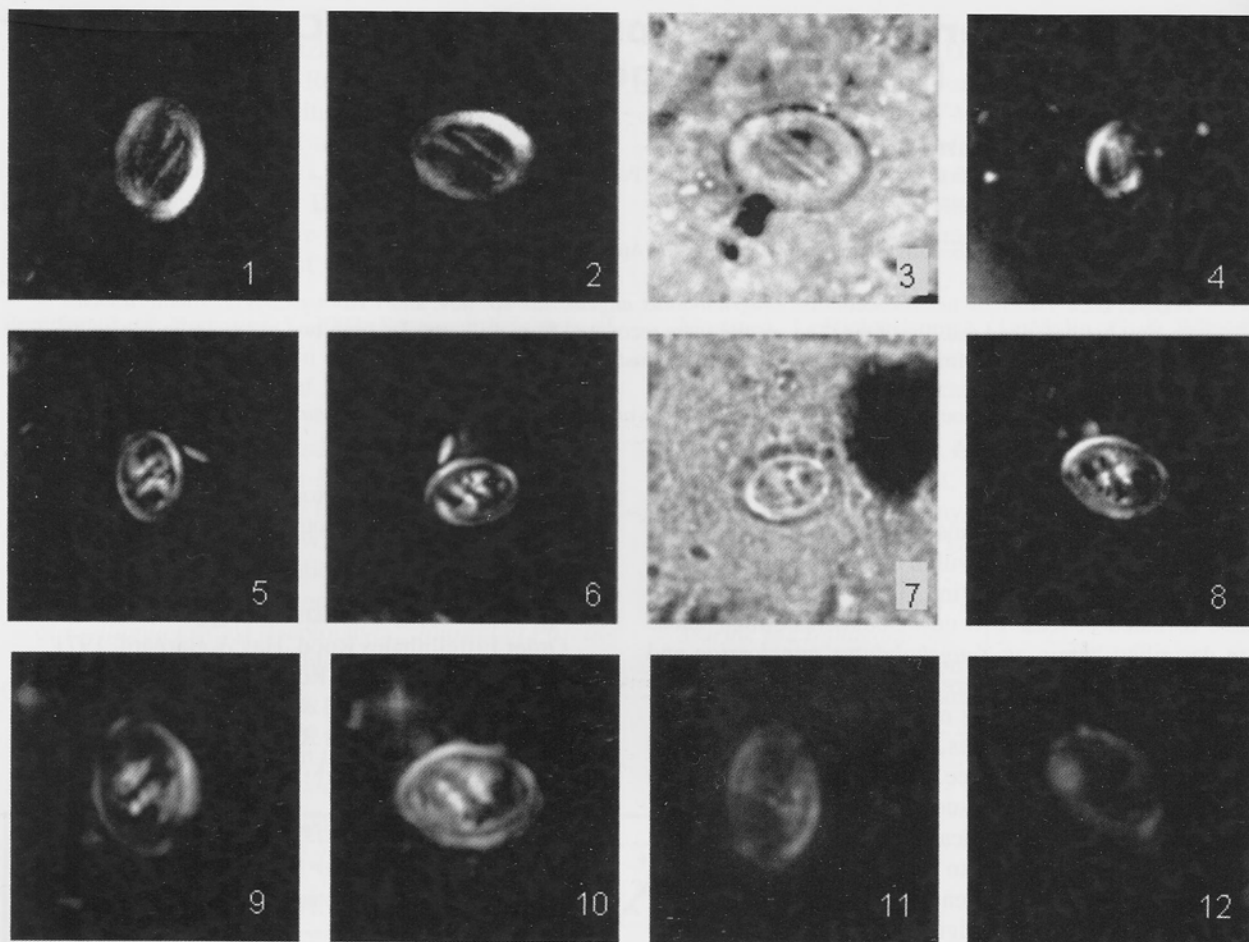


Plate 1. *Zeugrhabdotus angelozziae* sp. nov. 1-3. Holotype. Length: 10  $\mu\text{m}$ . BAFC-NP 3690. 4. Paratype. Length: 7.2  $\mu\text{m}$ . BAFC-NP 3523. 5-7. Paratype. Length: 8  $\mu\text{m}$ . BAFC-NP 3690. 8. Paratype. Length: 8  $\mu\text{m}$ . BAFC-NP 3690. 9-10. Paratype. Length: 10  $\mu\text{m}$ . BAFC-NP 3690. 11-12. Paratype. Length: 10  $\mu\text{m}$ . BAFC-NP 3690.

Type species *Zeugrhabdotus erectus*  
Deflandre in Deflandre & Fert, 1954  
*Zeugrhabdotus angelozziae* sp. nov.

Pl. 1, figs 1-12

**Derivatio nominis:** After biostratigrapher Gladys N. Angelozzi because of her pioneering labour in the study of calcareous nannofossils from Argentina.

**Diagnosis:** A medium to large species of *Zeugrhabdotus* that presents its central-area spanned by two parallel bars disposed oblique to the main axes of the ellipse.

**Description:** A medium to large, elliptical loxolith with bicyclic, external rim, with good development of both cycles. The central-area is spanned by two parallel, narrow bars disposed diagonally, at an angle that varies between 45° and 55° with respect to the minor axis of the ellipse. Under crossed nicols the external rim and the bars are birefringent, but the bars go into extinction at 45 degrees.

**Dimensions:** Length: 7-10  $\mu\text{m}$ ; width: 5-7  $\mu\text{m}$ .

**Stratigraphic range:** Albian-Cenomanian (Zones CC8-CC10 of Sissingh, 1977).

**Remarks:** The elliptical outline, wide central-area and the loxolithid-rim suggest the inclusion of this species in the genus *Zeugrhabdotus*. The most conspicuous feature that differentiates this species from others of the same ge-

nus is the diagonal central-area bars. One specimen shows extra sigmoidal struts supporting the bars under crossed nicols (Plate 1, figs. 5-7), but it could be due to over-growth. It has been recorded throughout Albian-Cenomanian assemblages with an abundance of 1 specimen in 11 to 100 fields of view at 1200X magnification.

**Provenance:** Sur Río Chico, Cañadón Salto.

**Holotype:** BAFC-NP 3690 (Pl. 1, figs 1-3).

**Paratypes:** BAFC-NP 3523 (Pl. 1, fig 4); BAFC-NP 3690 (Pl. 1, figs 5-7); BAFC-NP 3690 (Pl. 1, fig 8); BAFC-NP 3690 (Pl. 1, figs 9-10); BAFC-NP 3690 (Pl. 1, figs 11-12).

**Type locality:** Sur Río Chico 1300-1305 mbbp.

Order Podorhabdadales Rood, Hay & Barnard, 1971  
emend. Bown, 1987

Family Axopodorhabdaceae Bown & Young, 1997  
Genus *Cribrosphaerella* Deflandre in Piveteau, 1952  
emend Reinhardt, 1964

Type species *Cribrosphaerella ehrenbergii* (Arkhangelsky, 1912) Deflandre, in Piveteau, 1952

*Cribrosphaerella santacruzensis* sp. nov.

Pl. 2, figs 1-24

**Derivatio nominis:** After the Argentinean province of

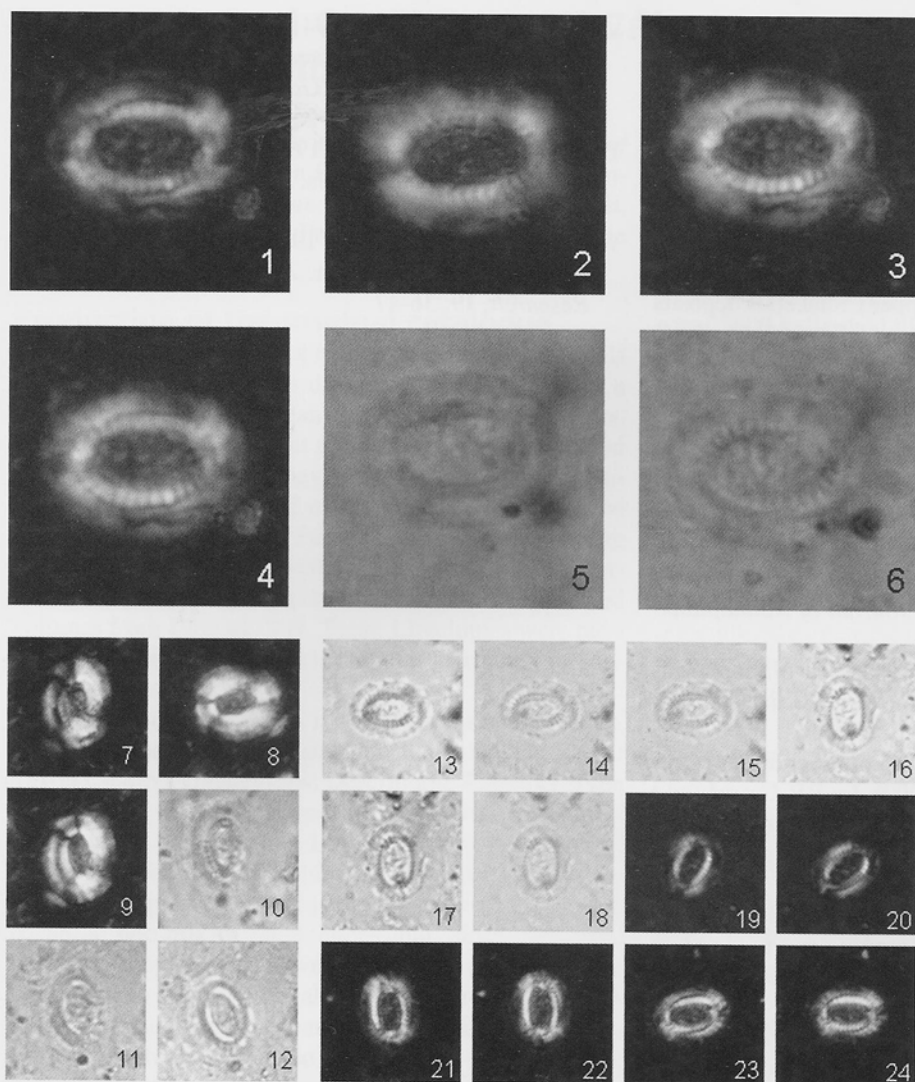


Plate 2. *Cribrosphaerella santacruzensis* sp. nov. 1-6. Holotype. Distal view. Length: 14  $\mu\text{m}$ , width: 9.5  $\mu\text{m}$ . BAFC-NP 3491. 7-12. Proximal view. Paratype. Length: 12  $\mu\text{m}$ . BAFC-NP 3486. 13-24. Paratype. Distal view. Length: 12  $\mu\text{m}$  BAFC-NP 3491.

Santa Cruz, where the species has been found.

**Diagnosis:** A large, elliptical to oblong placolith. Wide central-area spanned by a granular multi-perforated plate. The distal shield is wide and broad, expanded outwards. The distal inner tube cycle is markedly high and develops a crown.

**Description:** Large and bulky species of *Cribrosphaerella*, with an elliptical to oblong outline. The axial ratio varies from 1.3 to 1.45. Wide central-area is spanned by a granular multi-perforated plate that shows poor and heterogeneous birefringence under crossed nicols. The distal inner tube cycle is high and constructed by numerous radial elements producing a crown that shows high birefringence under crossed nicols. The outer cycle of the distal shield is constructed by numerous radial elements expanded outwards and with a lineal correspondence between these elements and those of the inner tube. The outer cycle shows good to poor birefringence, almost continuous within the outline. The proximal shield is approximately half as wide as the distal shield and shows good birefringence.

**Dimensions:** Length: 8–14  $\mu\text{m}$ ; width: 6–9.5  $\mu\text{m}$ .

**Stratigraphic range:** Albian–Cenomanian (Zones CC8–CC10 of Sissingh, 1977).

**Remarks:** Under crossed nicols, size and general aspect of *Cribrosphaerella santacruzensis* are similar to that of *Gaarderella granulifera*. It differs from the latter because *C. santacruzensis* has the central-area granulate-plate perforated, the inner tube cycle of the distal shield develops a high crown, and it presents a more elliptical axial ratio (1.25 to 1.45 in *C. santacruzensis* against the 1.15 to 1.34 of *G. granulifera*, measured over type material SEM photographs of Black, 1973). Because of the perforated central-area granulate-plate, the upper inner tube cycle that forms the crown and the radial disposition of its elements; this species is included within the genus *Cribrosphaerella*. This species differs from *Cribrosphaerella ehrenbergii* by the broader development of the outer cycle of the distal shield, its larger size, the almost oblong outline, and the more elliptical axial ratio. It has been recorded throughout

Albian to Cenomanian assemblages with an abundance of 1 specimen in 11 to 100 fields of view at 1200X magnification.

**Provenance:** Sur Río Chico, Cañadón Salto.

**Holotype:** BAFC-NP 3491 (Pl. 2, figs 1–6).

**Paratypes:** BAFC-NP 3486 (Pl. 2, figs 7–12); BAFC-NP 3491 (Pl. 2, figs 13–24); BAFC-NP 3493; BAFC-NP 3495; BAFC-NP 3517; BAFC-NP 3690.

**Type locality:** Cañadón Salto 1200–1209 mbbp.

### Acknowledgements

Petrobras-Energía S.A. Argentina are thanked for making this study possible. Marcelo Cagnolatti and Francisco Pángaro, kindly provided the samples; thanks are due also to Biostratigraphic Consultant GEMA SRL (Argentina) that provided equipment support. The author also thanks Dr. Sherwood W. Wise (Florida State University, USA) and Gladys Angelozzi (GEMA SRL) for their comments and advice. Two anonymous reviewers made interesting comments that improved the descriptions. Some of the

photographs were taken at the laboratories of Department of Earth, Ocean & Atmospheric Science, Carraway Building, Florida State University, Tallahassee, Florida, USA. Financial support was provided by the Consejo Nacional de Investigaciones Científicas y Técnicas (CONICET, Argentina) through grant PIP 00819.

## References

- Arkhangelsky, A.D. 1912. Verkhenemelovya otolozheniya vostoka europeyskog rosii (Upper Cretaceous deposits of east European Russia). *Materialien zur Geologie Russlands*, **25**: 1-631.
- Black, M. 1973. British Lower Cretaceous Coccoliths. I - Gault Clay (part 2). *Palaeontological Society of London (Monograph)*, **127**: 49-112.
- Bown, P.R. 1987. Taxonomy, biostratigraphy, and evolution of late Triassic-early Jurassic calcareous nannofossils. *Special Papers in Palaeontology*, **38**: 1-118.
- Bown, P.R. & Young, J.R. 1997. Mesozoic calcareous nannoplankton classification. *Journal of Nannoplankton Research*, **19**: 21-36.
- Bramlette, M.N. & Sullivan, F.R. 1961. Coccolithophorids and related nannoplankton of the early Tertiary in California. *Micropaleontology*, **2**: 129-188.
- Deflandre, G. 1952. Classe des Coccolithophoridés (*Coccolithophoridae* Lohmann, 1902). In: P.P. Grassé (ed.) *Traité de zoologie. Anatomie, systématique, biologie, 1, part 1, Phylogénie. Protozoaires: généralités. Flagellés*. Masson & Cie, Paris, 439-470.
- Deflandre, G. & Fert, C. 1954. Observations sur les Coccolithophoridés actuels et fossiles en microscopie ordinaire et électronique. *Annales de Paléontologie*, **40**: 115-176.
- Jordan, R.W. & Kleijne, A. 1994. A classification system for living coccolithophores. In: A. Winter y W.G. Siesser (eds.) *Coccolithophores*. Cambridge University Press, 83-105.
- Nulló, F.E.; Panza, J.L. & Blasco, G. 1999. Jurásico y Cretácico de la Cuenca Austral. In: R. Caminos (ed.) *Geología Argentina*. Instituto de Geología y Recursos Minerales. Anales, **29**: 528-535.
- Pérez Panera, J.P. Nanofósiles calcáreos y bioestratigrafía del Cretácico del Sudeste de la Cuenca Austral, Patagonia, Argentina. *Ameghiniana*, in press.
- Piveteau, J. 1952. *Traité de paléontologie*, Masson, París, **1**: 107-115.
- Reinhardt, P. 1964. Einige Kalkflagellaten-Gattungen (Coccolithophoriden, Coccolithineen) aus dem Mesozoikum Deutschlands. *Monatsberichte der Deutschen Akademie der Wissenschaften zu Berlin*, **6**: 749-759.
- Reinhardt, P. 1965. Neue Familien für fossile Kalkflagellaten (Coccolithophoriden, Coccolithineen). *Monatsberichte der Deutschen Akademie der Wissenschaften zu Berlin*, **7**: 30-40.
- Rood, A.P., Hay, W.W. & Barnard, T. 1971. Electron Microscope Studies of Oxford Clay Coccoliths. *Eclogae Geologicae Helveticae*, **64**: 245-272.
- Sissingh, W. 1977. Biostratigraphy of Cretaceous calcareous nannoplankton. *Geologie en Mijnbouw*, **56**: 37-65.
- Varol, O. & Girgis, M. 1994. New taxa and taxonomy of some Jurassic to Cretaceous calcareous nannofossils. *Neues Jahrbuch für Geologie und Paläontologie, Abhandlungen*, **192**: 221-253.
- Young, J.R. & Bown, P.R. 1997a. Higher Classification of calcareous nannofossils. *Journal of Nannoplankton Research*, **19**: 15-20.
- Young, J.R. & Bown, P.R. 1997b. Cenozoic calcareous nannofossil classification. *Journal of Nannoplankton Research*, **19**: 36-47.