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Oligocene Scleractinian Corals from CRP-3 Drillhole, McMurdo Sound (Victoria Land Basin, Antarctica)

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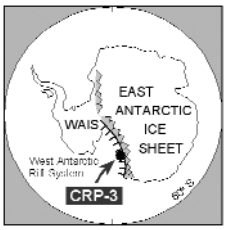
Abstract - The solitary scleractinian coral *Flabellum rariseptatum* Roniewicz & Morycowa, 1985 has been identified in CRP-3 drill core within mudstone lithologies in Unit LSU 3.1. The coral-bearing macrobenthic assemblages include infaunal and epifaunal suspension feeders suggesting a deep muddy shelf environment, characterized by moderate hydrodynamism and turbidity and enrichment in organic matter. *Flabellum rariseptatum* belongs to the Recent *Flabellum thouarsii* group and has a known stratigraphic range extending from the early Oligocene to the early Miocene of Antarctica. This is the first known occurrence of *Flabellum rariseptatum* from the Antarctic mainland.



INTRODUCTION

Cape Roberts Project CRP-3 retrieved core at 77.006° S and 163.719° E, about 14 km east of Cape Roberts, Ross Sea, down to 939 m below seafloor (mbsf). The cored strata consist of a thick early Oligocene succession resting on sedimentary deposits of unknown age and Devonian rocks and sediments belonging to the Beacon Supergroup (Cape Roberts Science Team, 2000). The Oligocene succession is rich in macrofossiliferous horizons hosting marine invertebrates discussed in detail by Taviani & Beu (this volume). In particular, solitary corals (Cnidaria, Scleractinia) have been identified in Oligocene strata and tentatively attributed to *Flabellum* (Cape Roberts Science Team, 2000). Solitary corals of Miocene age were also recovered in CRP-2 drill hole (Cape Roberts Science Team, 1999) but their extremely poor preservation did not allow identification beyond a general recognition as *Flabellum*-like corals (Taviani et al., in press). Corals from CRP-3, however, are reasonably well preserved (Cape Roberts Science Team, 2000, Fig. 5.9e) and suitable for taxonomic description.

This paper is, therefore, based upon the systematics of CRP-3 scleractinian coral material which represents a new source of palaeontological information for this group from a poorly known sector of Antarctica.

MATERIAL

The material under study was obtained from mudstone lithologies of Lithostratigraphic Unit LSU 3.1, between 137.21 and 140.74 mbsf (Fig. 1). The single specimen collected at 137.21 is poorly preserved and displays a sugar-like texture.

The best material available for the present study consists of two specimens recorded at 140.69 mbsf (Cape Roberts Science Team, 2000, Fig. 5.9e: hereafter referred to as CRP3-SCL). One specimen is nearly complete whereas the second one has been partially sectioned by drilling operations (see Fig. 2a, d). The coral-bearing assemblages also contain infaunal suspension-feeding bivalves, mostly carditids, plus scaphopods and terebratulid brachiopods (Cape Roberts Science Team, 2000, Taviani & Beu, in press).

TAXONOMY

Order: Scleractinia BOURNE, 1900
Suborder:
Caryophylliina VAUGHAN & WELLS, 1943
Family: Flabellidae BOURNE, 1905
Genus: *Flabellum* LESSON, 1831
Flabellum rariseptatum RONIEWICZ & MORYCOWA, 1985
(Fig. 2)

Flabellum cf. cuneiforme wailesi Conrad; Malumian et al. 1978, pl. 1, fig. 8 a, b
solitary coral *Flabellum*; Gaździcki & Wrona 1982, fig. 6a, b
solitary coral of the genus *Flabellum*; Birkenmajer et al., fig. 4b, c
Flabellum rariseptatum sp. n., Roniewicz &

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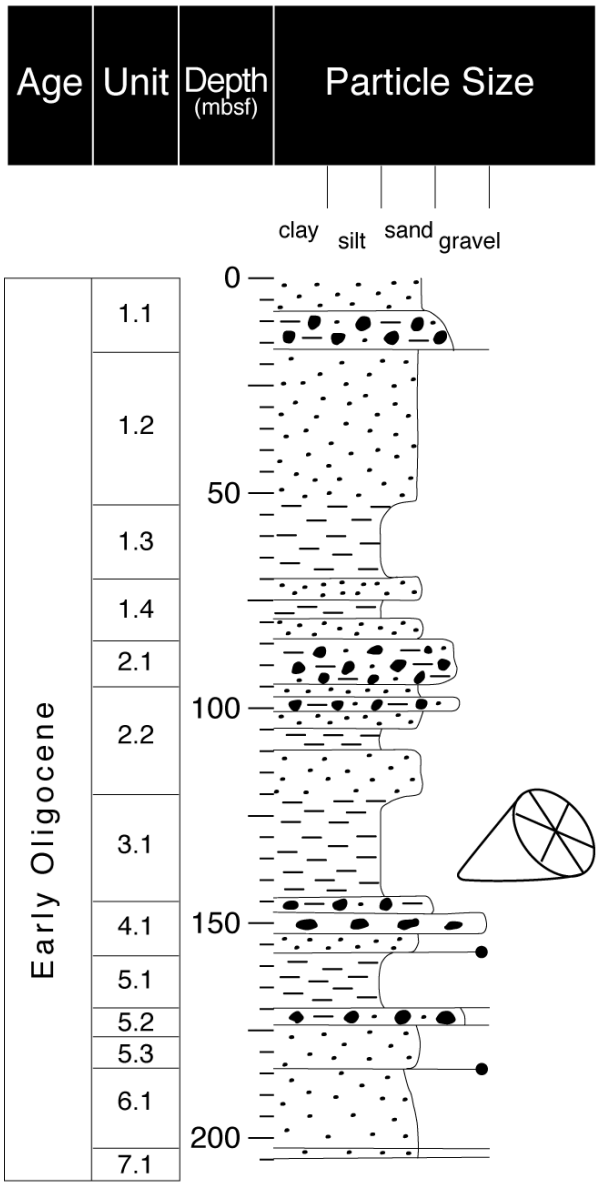

Fig. 1 - Lithostratigraphical log of the upper part of CRP-3 drill core showing position where *Flabellum rariseptatum* corals have been found (log slightly simplified from Cape Roberts Science Team, 2000).

Morycowa 1985, 101, figs. 2-4, pl. 1 figs 1-6, pl. 2 figs. 1-7.

Flabellum rariseptatum Roniewicz & Morycowa; Roniewicz & Morycowa 1987, 89-96, figs. 3-10, pls. 19-24.

Remarks: Unlike descriptions of many other fossil scleractinian species, the original description of *Flabellum rariseptatum* Roniewicz & Morycowa, 1985 is based on large number of specimens (*ca.* 320 coralla). The wide range of shape variation of coralla from the collection was ascribed to species variabilty (similar to that observed in some other extant *Flabellum* species reported from Subantarctic and Antarctic areas; see Cairns, 1982).

According to the corallum dimensions both specimens described here fit well with the size-range of the type specimens (Roniewicz & Morycowa, 1987, fig. 8). The largest (CRP3-SCL/01, see Fig. 2a-h) is a flattened conical corallum, *ca* 30 x 24 mm in calicular diameter and *ca* 19 mm in height. The smaller specimen (CRP3-SCL/01, see Fig. 2a, b, d, i-k) is more trochoid, *ca* 20 x 16 mm in calicular diameter and *ca* 10 mm in height (The specimen is broken at the proximal end).

Diagnostic of this species is the low septal density (about 9-12 per 10 mm) and both specimens exhibit this character. The external wall of CRP3-SCL/01 is partly abraded and probably the small, higher-cycle septa have been damaged. Nevertheless, impressions of septa are still clearly visible allow determination of septal density as *ca* 11 per 10 mm. A similar septal density (*ca* 10 per 10 mm) is shown also by specimen CRP3-SCL/02 (Fig. 2k) as well as, to judge by its septal impressions, by a strongly disintegrated single specimen collected at 137.21 mbsf.

Protocorallites are damaged in both specimens examined: in CRP3-SCL/01 the youngest, restricted to the stereome part has 24 septa (Fig. 2f) whereas in CRP3-SCL/02 the proximal part is broken at > 24 septal stage (Fig. 2i). The presence of twelve principal septa (*e.g.*, Fig. 2c, i) suggests the same organization of the septal apparatus as in all twelve-protoseptate *Flabellum* species from Antarctic region (see Gazdzicki & Stolarski 1992).

We suspect that the indeterminable solitary corals, with strongly recrystallised corallites, observed in Lower Miocene strata of CRP-2/2A (Cape Roberts Science Team, 1999: fig. 5.15h), probably belong to the same species.

BIOGEOGRAPHICAL AND CHRONOLOGICAL IMPLICATIONS

Cnidarians have a relatively scant fossil record in Antarctica, although Cretaceous scleractinian corals are among the first fossils recorded from this continent (Felix, 1909). Most reports of fossil cnidarians are related to Cretaceous-Palaeogene strata of the James Ross Basin, Antarctic Peninsula, and King George Island, South Shetland archipelago. The palaeontological record of Seymour and Snow Hill islands includes stylasterid hydrozoans (Stolarski, 1998) and scleractinians (Felix, 1909; Bibby, 1966; Macellari, 1988; Stilwell & Zinsmeister, 1992; Filkorn & Feldmann, 1992; Filkorn, 1994; Stolarski, 1996). Scleractinian corals occur in the Oligocene beds of the Cape Melville Formation of King George Island (Birkenmajer et al., 1983; Roniewicz & Morycowa, 1985, 1987).

Outside this area, documentation of Antarctic fossil corals *s.l.* is very sparse. Undetermined corals (presumably scleractinians) have been noted in one erratic block of Eocene age at Minna Bluff, McMurdo area (Harwood & Levy, 2000). Geologically younger

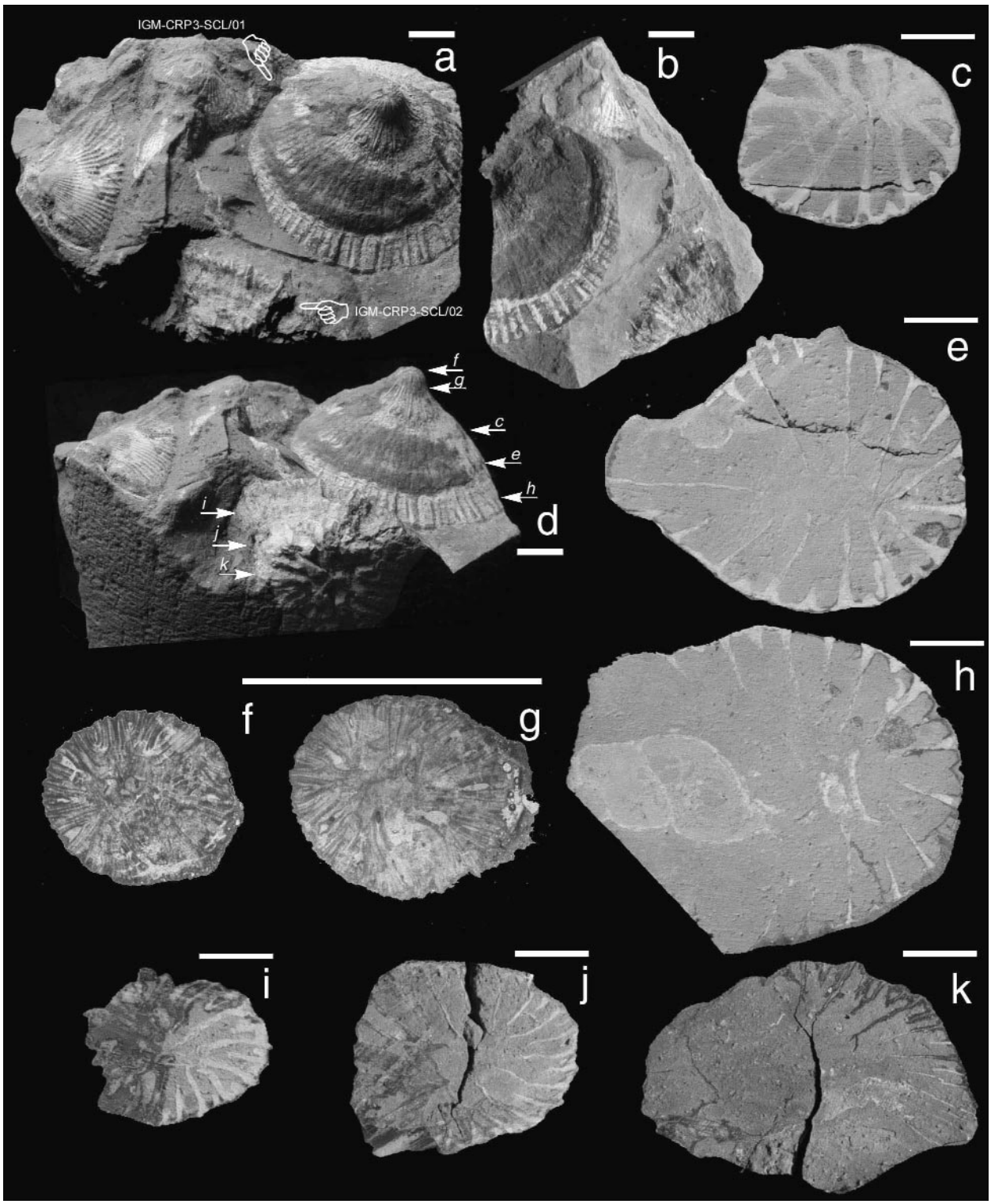

Fig. 2 - *Flabellum rariseptatum* Roniewicz & Morycowa, 1985. a, b, d) Specimens CRP3-SCL/01 and CRP3-SCL/02 as found in mudstone of the drill core CRP-3, Unit LSU 3.1, between 140.69 and 140.74 mbsf. a) Basal view of the CRP3-SCL/01 and lateral view of partly destroyed CRP3-SCL/02 (indicated respectively by hand symbols). Note indet. arcoid bivalve shell on the left side of the slab. b) Impressions of the CRP3-SCL/01 (left) and CRP3-SCL/02 (right) on the counterpart slab. d) Lateral view of the CRP3-SCL/01 (right-upper part) and basal view of partly destroyed CRP3-SCL/02 (center-lower part). Position of illustrated sections indicated with arrow. f, g) Thin sections from the earliest (probably 24 septate) preserved part of the CRP3-SCL/01. Interseptal space filled with the stereome. c, e, h) Polished sections of CRP3-SCL/01. i, j, k) Polished sections of CRP3-SCL/02. Scale bars = 5 mm.

records of cnidarians in the Ross Sea region refer to mid-Pleistocene octocorals in the CRP-1 drill core (Taviani et al., 1998; Taviani & Claps, 1998), scleractinians from raised Holocene deposits (*e.g.*, Baroni & Orombelli, 1987; Baroni et al., 1991), and Pleistocene corals from deep-sea cores (Taviani et al., 1993). Furthermore, well-preserved scleractinian solitary corals occur in the Pleistocene sponge-

carbonate sediments of Cape Barne, Ross Island (Taviani, unpublished).

Flabellum rariseptatum is probably the most abundant Tertiary coral of Antarctica and the sub-Antarctic region, and it also occurs in Tierra del Fuego, South America (Carmen Silva Formation, Lower Miocene: Malumian et al., 1978).

Thus far, only Lower Miocene samples from King George Island have yielded determinable specimens. The occurrence of *F. rariseptatum* in the Oligocene of King George Island was not certain because only fragmentary specimens were available for study (Gazdzicki & Stolarski, 1992). The specimens reported here comprise the first unquestionable finding of *F. rariseptatum* in the Oligocene of the Antarctic mainland. Many Recent taxa from the *Flabellum thouarsii* group have circumpolar distribution (see Cairns, 1982) and the relatively wide geographic distribution of *F. rariseptatum* (from Tierra del Fuego, South America to the Ross Sea) suggests a similar circumpolar distribution of this species. However, a more detailed mapping of each stratigraphical series is needed to confirm this hypothesis.

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