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## FOSSIL *FLABELLUM* (SCLERACTINIA) OF ANTARCTICA

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A new ahermatypic scleractinian coral, *Flabellum rariseptatum* sp.n., belonging to the *Flabellum thouarsit*-group of species, has been described from Tertiary glacio-marine sequence of the Cape Melville Formation cropping out at the King George Island, South Shetland Islands, Antarctica.

Key words: ahermatypic Scleractinia, Tertiary, Antarctica.

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### INTRODUCTION

The specimens under study were collected during the 5<sup>th</sup> Polish Antarctic Expedition, 1980—1981, to the H. Arctowski Station (Birkenmajer 1982a). The corals come from the glacio-marine sequence of the Cape Melville Formation that forms the upper part of the Moby Dick Group discriminated by Birkenmajer (1982b) in the area of the Melville Peninsula, King George Island, South Shetland Islands (Birkenmajer 1982b, 1984; Birkenmajer *et al.* 1983) (fig. 1). The whole sequence of the Moby Dick Group is crossed by andesite and basalt dykes. Radiometric data obtained from the andesite dykes (ca. 20 ma: Birkenmajer *et al.* 1985) allow to estimate the age of the group not younger than early Miocene.

The deposits of the glacio-marine sequence are composed of well bedded, grey, green, brownish and black shales and silty shales showing

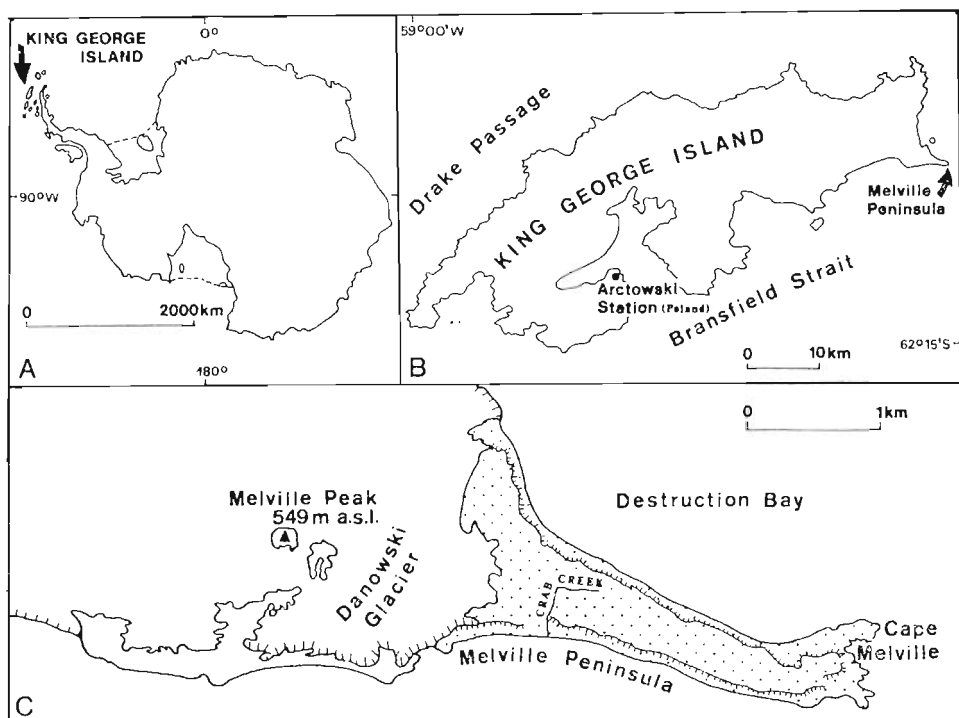


Fig. 1. Location of the King George Island (A) and the Melville Peninsula (B) and a map (C) showing distribution of the Tertiary (Moby Dick Group) at the Melville Peninsula (dotted).

intercalations of siltstones, sandstones and limestones. Iceberg rafted dropstones of all sizes from some millimeters up to 2 meters are scattered within the sediments. The glacio-marine deposits contain abundant fauna (Birkenmajer *et al.* 1983) such as frequent solitary corals *Flabellum vari-septatum* sp.n., polychaete jaws (Szaniawski and Wrona in press), bivalves, some of them in life position, gastropods (Karczewski in press), echinoids (Szymańska in press), abundant crabs and crab made trace fossils (Förster *et al.* 1985 and Förster *et al.* in press), abundant foraminifera, scarce fish remains, as well as Cretaceous belemnites (Birkenmajer *et al.* in press) and nannoplankton (Dudziak 1984). The last two groups have been recycled. Corals were collected in the black siltstones and silty shales of the upper part of the sequence, chiefly in the Crab Creek area and in some isolated points (fig. 2C). The character of coral-bearing and other sediments of the Cape Melville Formation, as well as the fauna contained therein indicate that the glacio-marine sequence was deposited in low energy water on the outer shelf (Birkenmajer 1982b, 1984).

Two coral collections have been gathered — one by Dr. A. Gaździcki and Dr R. Wrona, the other by Prof. Dr. K. Birkenmajer — and handed

over to the authors for study. The collections are housed at the Institute of Palaeobiology, Polish Academy of Sciences, Warsaw (abbreviated as ZPAL), and at the Institute of Geological Sciences, Jagiellonian University (UJ), Cracow. A detailed study on coral morphology and ontogeny will be published in a special volume of paleontologic results of the Polish Antarctic Expeditions (Roniewicz and Morycowa in press).

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## DESCRIPTION

Genus *Flabellum* Lesson, 1831

*Flabellum rariseptatum* sp.n.

(figs. 2–4; pl. 15: 1–6; pl. 16: 1–7)

?1978. *Flabellum* cf. *cuneiforme walesi* Conrad; Malumian *et al.*, pl. 1: 8a, b.

1982. Solitary coral *Flabellum*; Gaździcki and Wrona: fig. 6a, b.

1983. Solitary coral of the genus *Flabellum*; Birkenmajer *et al.*: fig. 4b and c.

*Syntypes*: ZPAL H VII/19, 23, 57, 89, UJ 125 P/1, 10, figured in the pl. 15: 1–6 (specimen ZPAL H VII/19 figured also in: Gaździcki and Wrona 1982, fig. 6a).

*Locus typicus*: Crab Creek, Melville Penninsula, King George Island, South Shetland Islands, Antarctica.

*Stratum typicum*: Cape Melville Formation.

*Derivatio nominis*: Lat. *rarus*—rare, from a small septal density.

*Diagnosis*: Trochoid, turbinate, cuneiform and flabellate, with pedicel 2–3 mm in diameter. Corallite surface smooth. Largest corallites up to 35×90 mm in diameter and ca. 75 mm tall. Septa thin, nonexsert. The number of septa equals 12 at the basal plate and ranges nearly 200 in largest specimens. Septal density commonly 9–12 per 10 mm. Upper septal edge from slightly convex to subhorizontal in outline, provided peripherally with a notch. Columella deep, spongy.

*Material*.—About 320 more or less complete specimens: ZPAL H VII/1-262; UJ 125P/1-60. Examined corals represent a whole series of postlarval ontogenetic stages.

*Description*.—Corallites variable in shape from trochoid, subcircular in cross section to flabellate, elliptical in cross section (fig. 2), free with the exception of

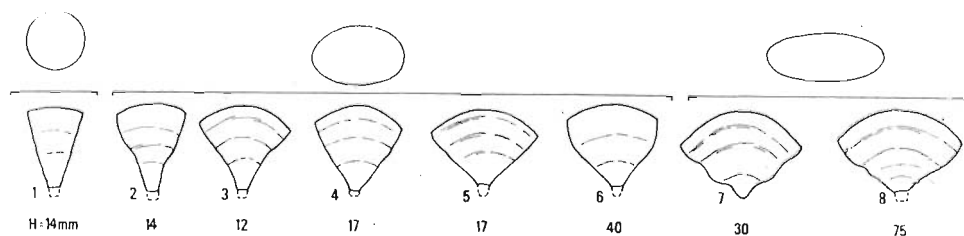


Fig. 2. *Flabellum rariseptatum* sp.n., type locality and horizon. Shape variability of coralla. Specimens: 1 ZPAL H VII/23, 2 UJ 126P/1, 3 UJ 125P/11, 4 UJ 125P/17, 5 UJ 125P/9, 6 ZPAL H VII/79, 7 UJ 125P/10, 8 ZPAL H VII/57.

early postlarval stages. Corallite surface smooth with thin, vertical lines corresponding to each septum (pl. 15: 4a, 6). Epitheca thin. Elliptical calices with lateral edges rounded (fig. 3; pl. 15: 4b, 5b; pl. 2: 1, 2, 5, 6). Calicular profile from slightly to strongly arched (pl. 15: 1b, 2, 5a, 4a, 6). Calicular edge smooth. Fossa narrow and deep (pl. 2: 3, 6, 7). Pedicel cylindrical (pl. 15: 3b; pl. 2: 4a, b), 2—3 mm in diameter and about 5 mm tall; on the basal plate 12 septa arranged in two cycles. The third cycle of septa develops most commonly at the height of 3—4 mm, where the great diameter is up to 6—7 mm. The largest flabellate specimen is 90×35 mm in diameter and more than 65 mm (estimated 75 mm) in height (pl. 15: 6). The largest turbinate specimen is 52×46 mm in diameter and more than 46 mm (est. 60 mm) in height (pl. 15: 5). The number of septa is about 200 in both, septal density 9—12 per 10 mm (rarely 8 or 13). Septa thin, nonexsert. Distal edge subhorizontal or slightly convex axialwards, with a shallow notch at the wall (fig. 4; pl. 16: 3). Inner edge subvertical (pl. 16: 3, 7), distally thin and smooth, and deeper in the fossa—wavy and thickened. Septal faces covered with subhorizontal rows of irregular, sharp, coarse granules (pl. 16: 3). Septal apparatus of more or less complete 6 septal cycles and rare S7 septa in largest specimens. Round scars 3—4 per 1 mm on the wall in the interseptal space. Columella deep, spongy, formed of extensions of inner edges of S1 and S2 in juvenils whilst S1—S4 in adults (pl. 16: 1, 5, 7). Thick stereom in the proximal corallite end. Angle between lateral corallite edges from 30° to 110°.

*Discussion.* — *Flabellum rariseptatum* sp.n. is related with the Subantarctic and Antarctic corals of the *thouarsii*-group of species. It resembles especially *F. impensum* Squires and *F. areum* Cairns (compare Squires 1962, 1963; Cairns 1982). With the former it has the same range of shape variability and nearly the same maximum size of corallite. However, the two species differ, above all, in the number of septa and septal density. Their number amounts to 200 in adult specimens of *F. rariseptatum* and 300 in *F. impensum*. As to the septal density per 10 mm it is 10 and 19—21 respectively. In this last character *F. rariseptatum* sp.n. is close to *F. areum* Cairns, a species with relatively small coralla. As one can judge from the illustrations and the description, adult corallites of *F. areum* and young *F. rariseptatum* are similar in the relationship between the corallite size and the number of septa (compare Cairns 1982: 35, pl. 11: 1—5). The new species differs from *F. areum* in having thinner pedicel and septa, as well as in deeper fossa and a subhorizontal or convex profile of the septal distal edge. Its ornamentation of septa is similar to that in *F. curvatum* Moseley (compare Squires 1961: figs. 20, 22). From other species of the group it differs as to the combination of features.

The oldest representative of the *F. thouarsii*-group is a species from the Oligocene of Argentina, which has not been examined palaeontologically up to now. Our species,

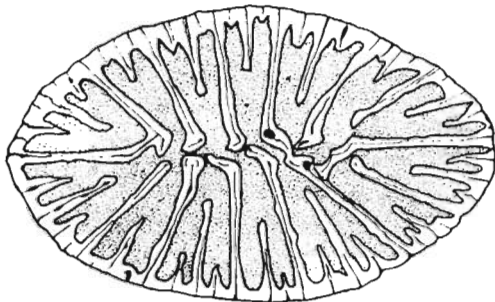


Fig. 3. *Flabellum rariseptatum* sp.n., type locality and horizon. Transverse section executed just above the columella, at the height of ca. 13 mm. Complete cycles of S1—S4 septa and some S5 septa at lateral calicular edges are visible in the lumen or in the wall. At the right calicular edge S5 septa are more advanced in development than at the left one. Juvenile corallite, ZPAL H VII/245.

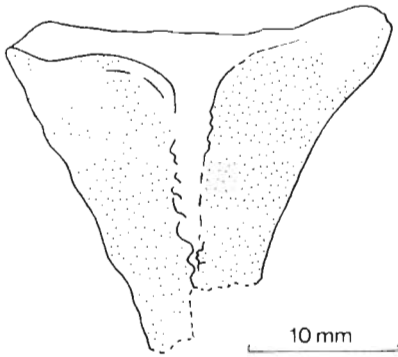


Fig. 4. *Flabellum rariseptatum* sp.n., type locality and horizon. Semi-schematic drawing to show a profile of the distal and internal septal edges; columella developed at the bottom of the calice. Specimen broken at the proximal end. UJ 125P/13.

well represented by a series of specimens varying in shape does not fit the brief description of that form given by Squires (1963: 35). The latter author considered that form as resembling *F. antarcticum* Gravier, a circum-Antarctic recent species, recently renamed *F. flexuosum* Cairns, 1982.

Malumian *et al.* (1979) reported occurrence of *Flabellum cf. cuneiforme wailesi* Conrad in the Tertiary of Tierra del Fuego, Argentina. The sequence is considered as Lower Miocene (Codignotto and Malumian 1981, and N. Malumian personal communication). Two photographs half the natural size (Malumian *et al.* 1979: pl. 1: 8a, b) show a rather small, flabellate corallite resembling in a general aspect *F. rariseptatum*.

*Flabellum rariseptatum* sp.n. occurs in the sequence underlying the Cape Melville Formation, i.e. in the Destruction Bay Formation constituting the middle part of the Moby Dick Group. The deposits of that formation are composed of sandstones and conglomerates with large-scale cross-bedding. The material of the formation is derived from reworked basalts underlying the sequence. Exotic rocks occur infrequently. Fossils are represented by bivalves, frequently in life position, brachiopods, gastropods, recycled belemnites, corals — *F. rariseptatum*, and wood fragments. The character of the sediment indicates that the sequence formed in shallow-marine environment, probably a bay (Birkenmajer 1984).

*Distribution.* — South Shetland Islands, Antarctica: probably Lower Miocene; Tierra del Fuego, South America: Lower Miocene.

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#### KOPALNY GATUNEK *FLABELLUM* (SCLERACTINIA) Z ANTARKTYKI

##### *Streszczenie*

Wśród obfitej fauny kopalnej odkrytej w 1980—81 roku przez uczestników V Polskiej Wyprawy Antarktycznej PAN (Birkenmajer 1982a) znajduje się nowy gatunek koralowca nierafowego, *Flabellum rariseptatum* sp.n. Fauna pochodzi z osadów lodowcowo-morskiej Formacji Cape Melville odsłaniających się na Półwyspie Melville'a na Wyspie King George w Południowych Szetlandach (fig. 1 A—C). Osady te są wykształcone przede wszystkim w postaci mułowców i ilowców z rozrzuconymi głazami wytopionymi z dryfujących gór lodowych. Formacja Cape Melville tworzy najwyższą część Grupy Moby Dick wyróżnionej na Wyspie King George przez Birkenmajera (1982a, 1984). Koralowce występują obok krabów (Förster *et al.* 1985, Förster *et al.* in press), szkarłupni (Szymańska in press), mięczaków (Karczewski in press), wieloszczetów (szczęki i aparaty szczękowe, Szaniawski i Wrona in press), otwornic, oraz kredowych belemnitów i nannoplanktonu, które są redeponowane (Birkenmajer *et al.* 1983; Dudziak 1984). Uważa się, że osady Formacji Cape Melville powstawały w spokojnej wodzie w obrębie zewnętrznego szelfu (Birkenmajer 1982b, 1984). Górną granicę wieku osadów tej formacji określają przecinające je dajki andezytowe, które liczą około 20 mln lat (Birkenmajer *et al.* 1985).

Nowy gatunek należy do grupy gatunków z kręgu *F. thouarsii* szeroko rozprzeszczerzonych od oligocenu do dziś wokół Antarktydy i w strefie subantarktycznej.

Osobniki dochodzą do dużych rozmiarów i odznaczają się bardzo zmiennym kształtem (fig. 2; pl. 15: 1—6). Kombinacja takich cech, jak cienkie i stosunkowo mało zagęszczone septa oraz lekko wypukły lub prawie poziomy zarys dystalnego brzegu septów (figs. 3, 4; pl. 16: 1—3) różni ten gatunek od pokrewnych. Korality mają bardzo cienki pedicel z wklęsłą od dołu płytką bazalną oraz gąbczastą kolumellę o mało zwężonej budowie (pl. 16: 4—7).

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EXPLANATION OF PLATES 15 AND 16

All specimens are from Cape Melville Formation, King George Island,  
Antarctica

Scale bar 10 mm if not stated otherwise

Plate 15

A typical series of *Flabellum rariseptatum* sp.n.

1. Juvenile corallite with an abraded surface and a slightly damaged distal end: *a* distal and *b* side views. UJ 125P/1.
2. Juvenile flabellate corallite with a partially abraded surface. UJ 125P/10.
3. Juvenile corallite with an abraded surface: *a* proximal and *b* side views. ZPAL H VII/23.
4. Adult flabellate corallite with broken proximal and distal portions: *a* side and *b* proximal views. ZPAL H VII/19.
5. Adult conical corallite with an abraded surface and a broken proximal end: *a* side and *b* proximal views. ZPAL H VII/89.
6. Adult flabellate corallite with a well preserved surface and distal edge; proximal end broken, side view. ZPAL H VII/57.

Plate 16

The shape of septa and the structure of the columella in *Flabellum rariseptatum* sp.n

1. Flabellate specimen, cross-section executed just above the columella. Circular sections of vertical tubes of boring organisms are seen in the wall and in some septa. ZPAL H VII/68.
2. Strongly oblique transverse section of the distal portion of a subcircular calice. Septa in the calice are very thin. ZPAL H VII/241-1.
3. Longitudinal broken section of the corallite showing distal and internal septal edges; proximal end broken. Coarse ornamentation of septal faces is visible UJ 125P/13.



4. Longitudinally broken pedicel, distal (a) and side (b) views. Septa of two well developed cycles are visible; basal plate is concave upwards and sharply rimmed (b). ZPAL H VII/248.
5. Juvenile corallite deeply eroded distally and showing columella. ZPAL H VII/247.
6. Distal view of juvenile corallite, transverse section executed near the distal calicular edge. Size differentiation of septal cycles and elongation of narrow calicular fossa are well expressed. ZPAL H VII/246.
7. A corallite longitudinally broken along the calicular fossa and showing spongy structure of columella. Proximal and distal corallite portions are destroyed. ZPAL H VII/81.

