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ECHINOIDS FROM THE CAPE MELVILLE FORMATION
(LOWER MIocene) OF KING GEORGE ISLAND,
WEST ANTARCTICA

(Plate 44)



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Echinoids from the Lower Miocene Cape Melville Formation of King George Island (South Shetland Islands, Antarctica) have been described. Scanty and strongly weathered material allows only tentative assignment of this fauna to cidarid, echinid and schizasterid genera.

Key words: Echinoids, Lower Miocene, Antarctica.

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JEŻOWCE Z OSADÓW FORMACJI CAPE MELVILLE (DOLNY MIOCEN) WYSPY KRÓLA JERZEGO,
ANTARKTYKA ZACHODNIA

Streszczenie. — Zbadano dolnomiocenne jeżowce znalezione w lodowcowo-morskich marglistych łupkach i mułowcach z wkładkami piaskowców z formacji Cape Melville na Wyspie Króla Jerzego, Szetlardy Południowe, Antarktyka Zachodnia (fig. 1). Zły stan zachowania okazów pozwolił jedynie na stwierdzenie w analizowanym materiale przedstawicieli rodzin: Cidaridae, Echinidae i Schizasteridae. Zaproponowano z zastrzeżeniem zaliczenie zbadanych okazów do rodzajów: *Notocidaris* MORTENSEN (pl. 44 : 1—2), *Sterechinus* KOEHLER (pl. 44 : 3—4) i *Schizaster* L. AGASSIZ (pl. 44 : 5).

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INTRODUCTION

The echinoids here described were collected during the Vth Polish Antarctic Expedition to H. ARCTOWSKI Station in 1980—1981. They were subsequently submitted to me for identification and description by Dr. A. GAJDZICKI and Dr. R. WRONA (Institute of Paleobi-

logy, Polish Academy of Sciences, Warsaw) to whom I am very grateful for the opportunity of studying them.

The specimens come from the glacio-marine sediments of the Cape Melville Formation, King George Island, West Antarctica (GAŁDZICKI and WRONA 1982). The stratigraphy at the fossil locality and conclusion as to the age of the Cape Melville Formation have been established after extensive investigation including radiometric study (BIRKENMAJER *et al.* 1983, 1985; BIRKENMAJER 1987, this volume). They all point to the Early Miocene age of sediments in which echinoids here described were found. According to these investigations the Cape Melville Formation is about 200 meters thick consisting of grey to green brownish and black shale and silty shale, with siltstone fine-grained sandstone intercalations. It contains, besides numerous microfossils, abundant marine invertebrate remains such as solitary corals, polychaetes,

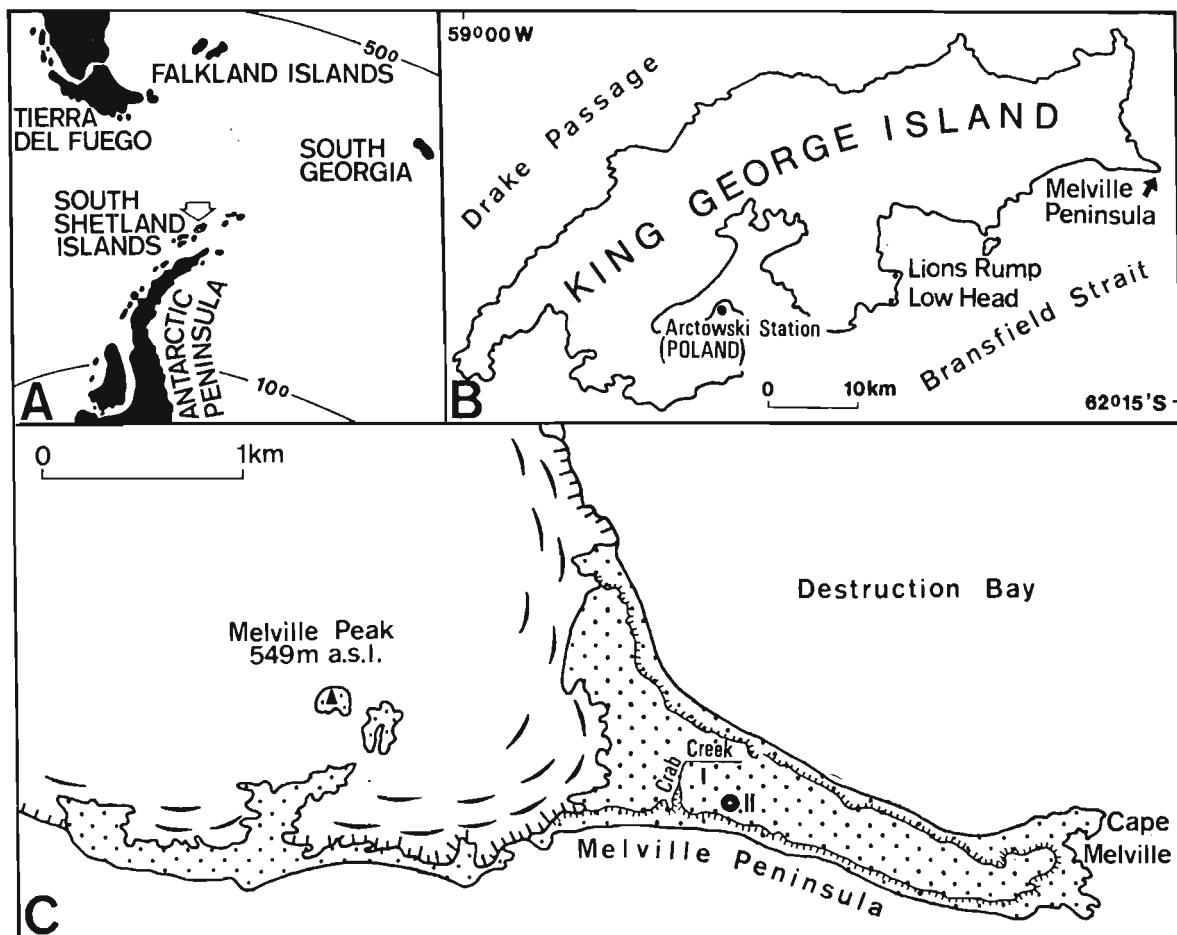


Fig. 1

A Map showing position of the King George Island in the South Shetland Islands. B Location of the Low Head-Lions Rump area and Melville Peninsula. C Echinoid localities (I-II) on the Melville Peninsula.

bivalves, gastropods, scaphopods, crabs, asteroids and echinoids (Fig.1). In this assemblage the echinoids are an important element. In fact, many fragments of rock contain echinoid remains as indicated by numerous fractured plates and spines imbedded in very hard matrix and therefore not retrievable for examination. Suitable for study are tests or more often fragments of tests which are badly weathered with the surface of plates lacking important diagnostic features such as tuberculation. Moreover, the preservation of the material suggests that in the

process of fossilization most of specimens suffered post-depositional compaction and fracturing. According to these circumstances only tentative assignments are suggested.

The collection here described is housed in the Institute of Paleobiology, Polish Academy of Sciences, Warsaw (abbr. ZPAL). I am grateful to the members of technical staff of the Institute, Ms. GRAŻYNA PODBIELSKA (photographer) and Mr. WOJCIECH SICIŃSKI (technician) for their help in preparation of the plate.

I am very indebted to Dr. PORTER M. KIER of Smithsonian Institution (Washington) for his critical reading of the manuscript.

DISCUSSION

Representatives of three families have been found in sediments of the Cape Melville Formation: Cidaridae, Echinidae and Schizasteridae. Most of the specimens belong to cidarids: one of them is almost complete (pl. 44 : 1) but slightly distorted and denuded. In addition, fragmentary spines have been found but no one in association with corresponding tubercle so they cannot be with certainty considered as belonging to the test although probably it is so, as they were found on the same slab. The same may be stated about echinid remains represented by strongly weathered, distorted fragments of tests (pl. 44 : 3—4) and spines always found separately, in close proximity of test. The only schizasterid specimen (pl. 44 : 5) is in poor condition, strongly flattened, with only one petal and fragment of the peripetalous fasciole preserved.

There is no conclusive answer to the question whether this material reflects the whole echinoid fauna living in the Early Miocene in the area. Physical factors acting during fossilization and subsequent weathering could eliminate from the record the echinoids of some other groups, if they had more fragile tests. It is significant that only one schizasterid has been found. According to KIER (1977 : 171) irregular echinoids are more likely to be fossilized, especially those having burrowing habit like schizasterids. However the very thin test of these echinoids could contribute to the poor chance of finding them as fossils. According to GAŁDZICKI (pers. com.) the sediment in which the echinoids were found was deposited in a submarine plain of the outer shelf. The bathymetrical range of modern species, close to the fossil material, makes this conclusion plausible.

Echinoids of King George Island are hitherto poorly known, and this also is true of whole Antarctic region (HOTCHKISS 1982). This situation may improve soon as the study of undescribed material and restudy of type and published specimens is actually under way (HOTCHKISS 1982 : 682). As this author states, the King George Island materials are of great interest for revealing the history of Antarctic fauna and the age and correlation of *Pecten* Conglomerate¹⁾ found in King George Island localities (Low Head-Lions Rump) and on Cockburn Island near Antarctic Peninsula. Echinoid remains from the Polonez Cove Formation of Low Head-Lions Rump area, because of their poor preservation, have been only tentatively assigned to *Notocidaris* (Cidaridae) and *Sterechinus* (Echinidae), the genera containing almost exclusively recent species (JESIONEK-SZYMAŃSKA 1984) actually restricted in the geographical range to the Antarctic and Subantarctic region. The echinoids here described collected at Cape Melville are also very poorly preserved and their identification must be treated with reservation. They seem to belong to the same genera *Notocidaris* and *Sterechinus* (see Description) and the only irregular echinoid may represent very common (from the Cretaceous to Recent) genus *Schizaster*. As the details of morphology of *Notocidaris* and *Sterechinus* are in the Cape Melville material obliterated, it is not safe to suggest that they are conspecific with Low Head-Lions Rump echinoids, although it seems quite possible.

¹⁾ *Pecten* Conglomerate (= Low Head Member of the Polonez Cove Formation); see BIRKENMAIER 1982.

An echinoid test reported from the *Pecten* Conglomerate of Low Head-Lions Rump area according to HOTCHKISS (1982 : 682) may belong to the extant South African genus *Polyechinus* (Echinidae). As no description nor illustration of the specimen as yet is presented, it is not possible to comment on this assignment. The main feature of *Polyechinus* are 4-geminate ambulacral plates. If the specimen from the *Pecten* Conglomerate has this feature, then it is certainly distinct from the Cape Melville materials assigned to *?Sterechinus*, where all ambulacrals are 3-geminate.

The much discussed problem of the possible relationships of the Antarctic fauna with that of the other regions (ORTMANN 1902) is, in what concerns echinoids, handicapped by the lack of full analysis of this fauna and generally bad preservation of hitherto known King George Island material. As reported lately by ZINSMEISTER (1981) echinoids from the Middle Tertiary of Southern Argentina point only to the family level relationships between this region and South Shetland Islands as represented by King George Island echinoid fauna hitherto known.

SYSTEMATIC DESCRIPTION

Family **Cidaridae** GRAY, 1825

Subfamily **Ctenocidarinae** MORTENSEN, 1928

Genus ***Notocidaris*** MORTENSEN, 1909

?*Notocidaris* sp.

(pl. 44 : 1—2)

Material. — One almost complete, strongly weathered test, 3 fragments of interambulacra, each with one row of ambulacral plates; several broken spines found on the same slabs probably also belong here.

The only test is distorted hence the diameter of 36 mm is inferred; height of test is about 1/2 of diameter. Surface of plates strongly abraded, only some primary perforate and noncrenulate tubercles could be ascertained on interambulacral plates. Areoles large, not very deep, extrascrobicular surface densely granulated, but because of weathering it was not possible to discern the differences in size of secondary tubercles. Ambulacra slightly sinuate, with pores small and obliquely arranged. Details of tuberculation not known.

Remarks. — The obliquity of pores is a very important feature of *Notocidaris* genus. However other characteristics like the presence of a naked area in the ambulacra and spearhead-shaped primary spines have not been found in this material. This is the reason why this material is assigned to *Notocidaris* with reservation. The accessible details of morphology suggest that this material may be conspecific with that from the Low Head Member of the Polonez Cove Formation (JESIONEK-SZYMAŃSKA 1984 : 127).

Occurrence. — King George Island, Melville Peninsula (profile I), Cape Melville Formation (Lower Miocene).

Family **Echinidae** GRAY, 1825

Genus ***Sterechinus*** KOEHLER, 1901

?*Sterechinus* sp.

(pl. 44 : 3—4)

?*Isechinus* sp., GAŁDZICKI and WRONA 1982, 401, fig. 7b.

Material. — Four distorted and strongly abraded fragments of tests, several echinid primary spines, some of them flattened, with altered microstructure (probably regenerated).

Description. — Estimated diameter is about 50 mm; height of test may reach half of diameter. Interambulacral plates, especially those of ambital region, wide and low. Primary tubercles nonperforate and noncrenulate, distinctly larger than secondary ones. The remaining surface of plates covered with not very dense granulation. Ambulacra wide, at ambital region almost as wide as interambulacra. They are composed of 3-geminate plates, each triad bearing one large tubercle. Pore zones narrow, pores situated close to the adradial suture.

Remarks. — Preliminary identification of this material as *?Isechinus* sp. (in GAŁDZICKI and WRONA 1982: 401, fig. 7b) must be rejected after more material is examined. Main feature of *Isechinus*, strongly developed secondary tubercles, has not been confirmed on the better preserved specimens.

Occurrence. — King George Island, Melville Peninsula (profile I), Cape Melville Formation (Lower Miocene).

Family **Schizasteridae** LAMBERT, 1905

Genus **Schizaster** L. AGASSIZ, 1836

?*Schizaster* sp.

(pl. 44 : 5)

Description. — The only specimen is strongly flattened and weathered. Some fragments of test are preserved. The test is 45 mm long and 43 mm wide but this measurement may be inexact because of flattening of the test. Cordiform shape, the presence of short, deep petal V and fragment of peripetalous fasciole are the reason of the tentative assignment of this specimen to *Schizaster*.

Occurrence. — King George Island, Melville Peninsula (profile II), Cape Melville Formation (Lower Miocene).

REFERENCES

- BIRKENMAJER, K. 1982. Pliocene tillite-bearing succession of King George Island (South Shetland Islands, Antarctica). — *Stud. Geol. Polonica*, **74**, 7—72.
- 1987. Oligocene-Miocene glacio-marine sequences of King George Island (South Shetland Islands), Antarctica. In: A. GAŁDZICKI (ed.), *Palaeont. Results Polish Antarctic Expeds. I.* — *Palaeont. Polonica*, **49**, 9—36.
- , GAŁDZICKI, A. and WRONA, R. 1983. Cretaceous and Tertiary fossils in glacio-marine strata at Cape Melville, Antarctica. — *Nature*, **303**, 56—59.
- , —, KREUZER, H. and MÜLLER, P. 1985. K-Ar dating of the Melville Glaciation (Early Miocene) in West Antarctica. — *Bull. Pol. Acad.: Earth Sc.*, **33**, 15—23.
- GAŁDZICKI, A. 1984. The *Chlamys* coquinas in glacio-marine sediments (Pliocene) of King George Island, West Antarctica. — *Facies*, **10**, 145—150.
- and WRONA, R. 1982. Late Cretaceous and Tertiary fossils from glacio-marine sediments of Melville Peninsula, King George Island, West Antarctica (In Polish, English summary). — *Przegl. Geol.*, **8**, 399—404.
- HOTCHKISS, F. H. C. 1982. Antarctic Fossil Echinoids: Review and Current Research. In: C. CRADDOCK (ed.), *Antarctic Geoscience* 679—684. The University Press, Madison.
- JEŚIONEK-SZYMAŃSKA, W. 1984. Echinoid remains from „*Pecten* Conglomerate” (Polonez Cove Formation, Pliocene) of King George Island (South Shetland Islands, Antarctica). — *Stud. Geol. Polonica*, **79**, 125—130.
- KIER, P. M. 1977. The poor fossil record of the regular echinoid. — *Paleobiology*, **3**, 168—174.

- MORTENSEN, Th. 1928. A monograph of the Echinoidea. 1: Cidaroidea, 551 pp.; 1943, 3/3 Camarodonta (II), 446 pp.
C. A. REITZEL, Copenhagen.
- ORTMANN, A. C. 1902. Tertiary invertebrates. Princeton Univ. Exped. Patagonia, Rept. 4 (2), 45—322. E. Schweizerbart'sche Verlagshandlung (E. Nägele), Stuttgart.
- ZINSMEISTER, W. J. 1981. Middle to Late Eocene invertebrate fauna from the San Julian Formation at Punta Casamayor, Santa Cruz Province, Southern Argentina. — *J. Paleont.*, **52**, 1083—1102.

EXPLANATION OF THE PLATE 44

1—2. *?Notocidaris* sp.

1a upper view, 1b side view, ZPAL E IV/2, \times 2.
2 fragment of test, ZPAL E IV/2, \times 2.

3—4. *?Sterechinus* sp. fragments of tests in side views.

3 ZPAL E IV/3, \times 2.
4 ZPAL E IV/4, \times 3.

King George Island, Melville Peninsula (locality I): Cape Melville Formation (Lower Miocene).

5. *?Schizaster* sp. ZPAL E IV/5.

5a upper view, \times 1,5.
5b enlargement of petal V with fragment of peripetalous fasciole, \times 6.

King George Island, Melville Peninsula (locality II): Cape Melville Formation (Lower Miocene).

