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A new species
of genus *Panopea* (Bivalvia)
from King George Island, Antarctica

ABSTRACT: A new species of genus *Panopea* Ménard de la Groye, named *P. (P.) andreae* sp. n. is described in detail. It is the most common of bivalve species recorded in the Destruction Bay Formation (Early Miocene) of King George Island (South Shetland Islands, West Antarctica). The bivalve material collected includes in addition: *P. (P.)* aff. *worthingtoni* Hutton, *Eurhomalia* cf. *antarctica* (Shermann and Newton) and *E. cf. newtoni* (Wilcknes).

Key words: Antarctica, Tertiary, paleontology (Bivalvia, Hiatellidae).

Introduction

The bivalves for the present study were collected by Assoc. Prof. A. Gaździcki and Dr. R. Wrona during the 5th Polish Antarctic Expedition (1980–1981) to *H. Arctowski* Station led by Prof. Dr. K. Birkenmajer. The fossils have been derived from the 3 m thick set of green coarse-grained basaltic sandstone of the Destruction Bay Formation exposed in Wrona Buttress (Site 194, see Birkenmajer in Biernat *et al.* 1985), eastern part of King George Island (Fig. 1).

Geological description of the Destruction Bay Formation can be found in Biernat *et al.* (1985) and Birkenmajer and Łuczowska (1987).

Apart from specimens of *Panopea (P.) andreae* sp. n. and *P. (P.)* aff. *worthingtoni* Hutton, 1873 preserved in life position as external or compositoid moulds, the bivalve fauna includes also *Eurhomalia* cf. *antarctica* (Shermann and Newton, 1897) and *E. cf. newtoni* (Wilcknes, 1911) (Pl. 1, Figs 2, 3 and 5).

The bivalve collection from Wrona Buttress is housed in the Institute of Paleobiology of the Polish Academy of Sciences in Warszawa, under the number ZPAL L.III/1–35.

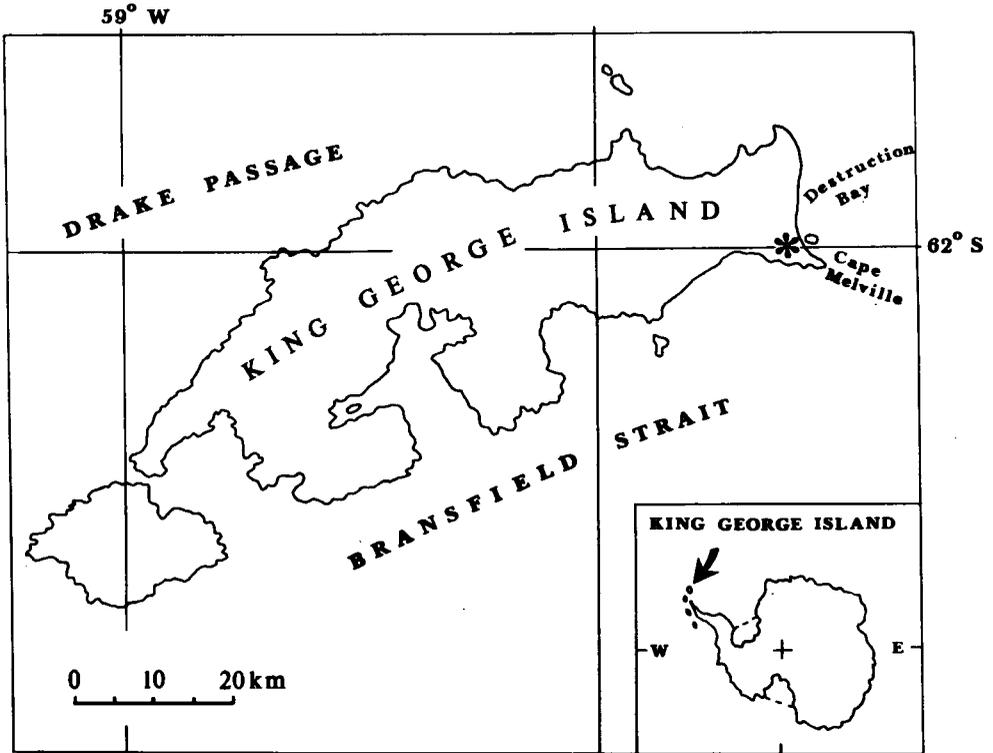


Fig. 1. Key maps to show location of the Wrona Buttress (asterisk) in King George Island, and in Antarctica (inset) (after Biernat *et al.* 1985)

Systematic paleontology

Order *Myoida* Stoliczka, 1870

Family *Hiatellidae* Gray, 1824

Genus *Panopea* Ménéard de la Groye, 1807

Subgenus *Panopea* (*Panopea*) Ménéard de la Groye, 1807

Type species: *Mya glycymeris* Born, 1778

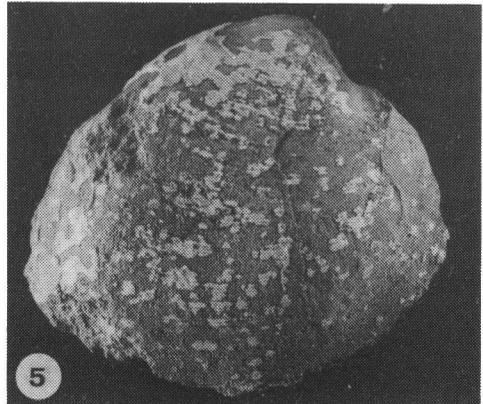
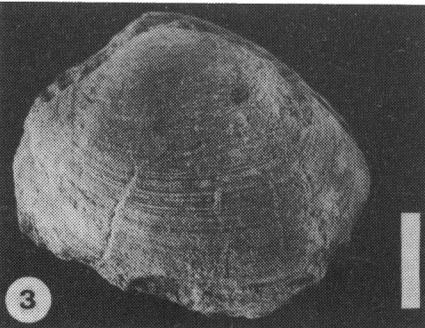
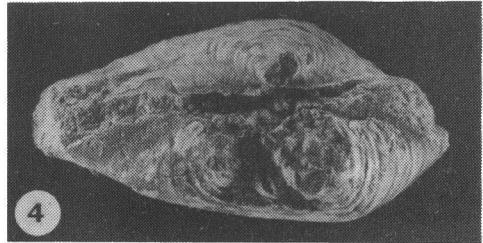
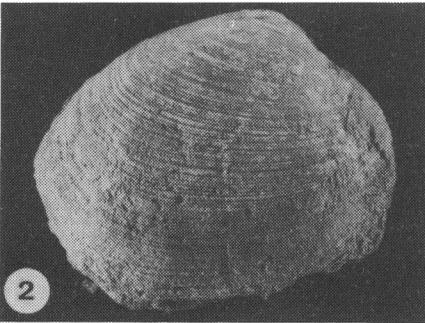
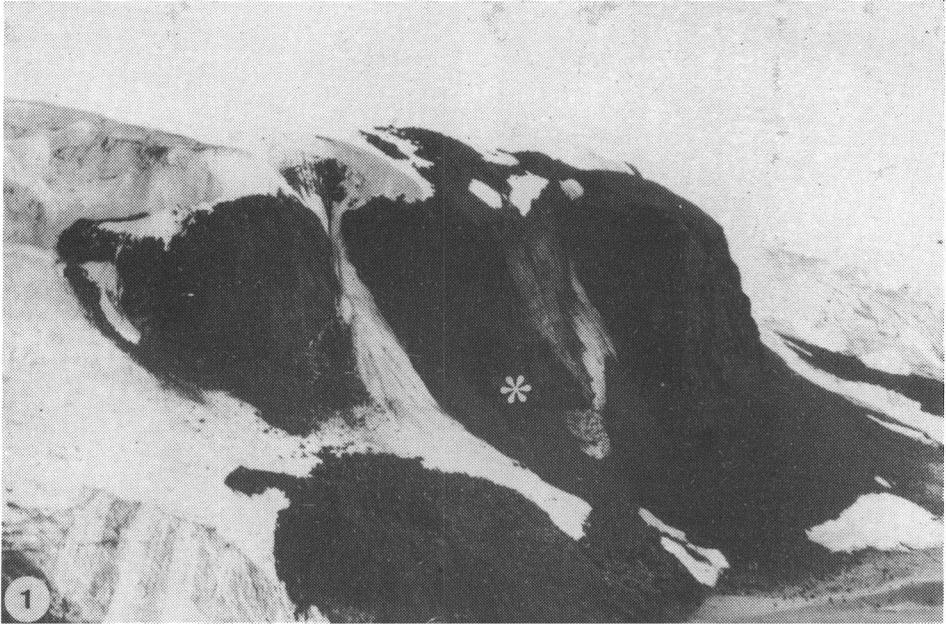
Panopea (*Panopea*) *andreae* sp. n.

(Pl. 1, Fig. 4; Pl. 2, Figs 1, 2, 4–7; Pl. 3, Figs 1–4, 7–10)

1984. *Panopea* cf. *undatoides* (Ortmann, 1902); Pugaczewska in Gaździcki and Pugaczewska: 105–106, Pl. 16, Figs 1–3.

Holotype: specimen ZPAL L.III/22; Pl. 2, Figs 1 and 2.

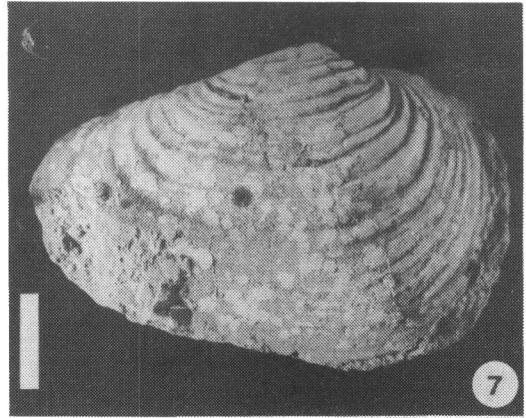
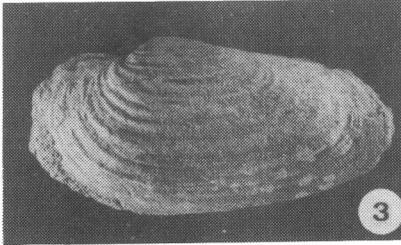
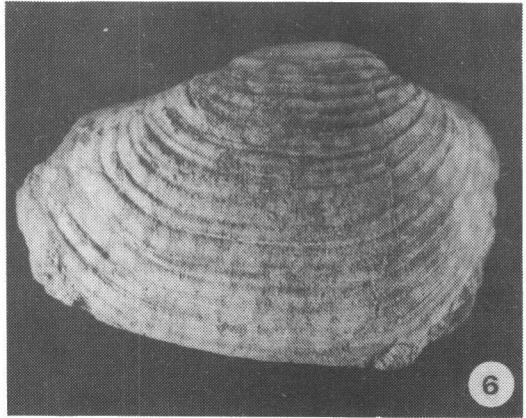
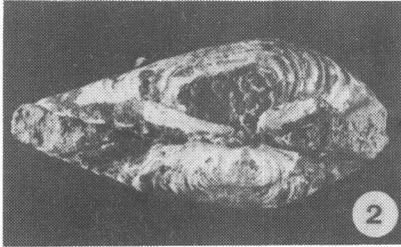
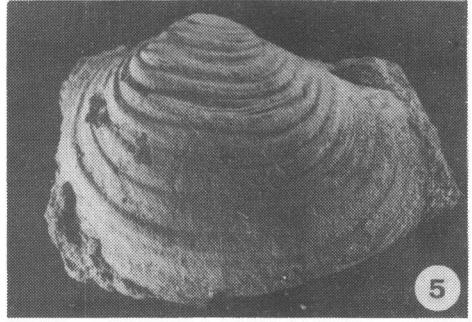
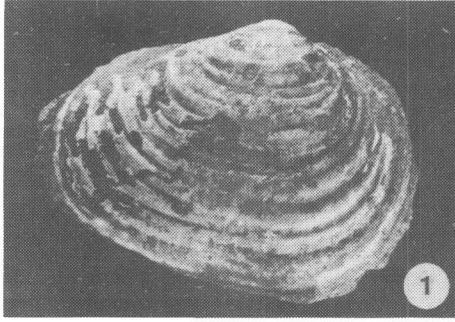
Type horizon: type section of the Destruction Bay Formation, Early Miocene.



1. Exposure of the Destruction Bay Formation at Wrona Buttress; Asterisk shows bivalve-bearing strata (Site 194)

Photo by A. Gaździcki, 1981

- 2-3. *Eurhomalia* cf. *newtoni* (Wilcknes) ZPAL L. III/35, 2.-RV EM, 3.-LV EM
4. *Panopea* (*Panopea*) *andreae* sp. n., ZPAL L. III/9 EM view from the dorsal margin
5. *Eurhomalia* cf. *antarctica* (Shermann and Newton) ZPAL L. III/34 RV EM
Scale bar 1 cm



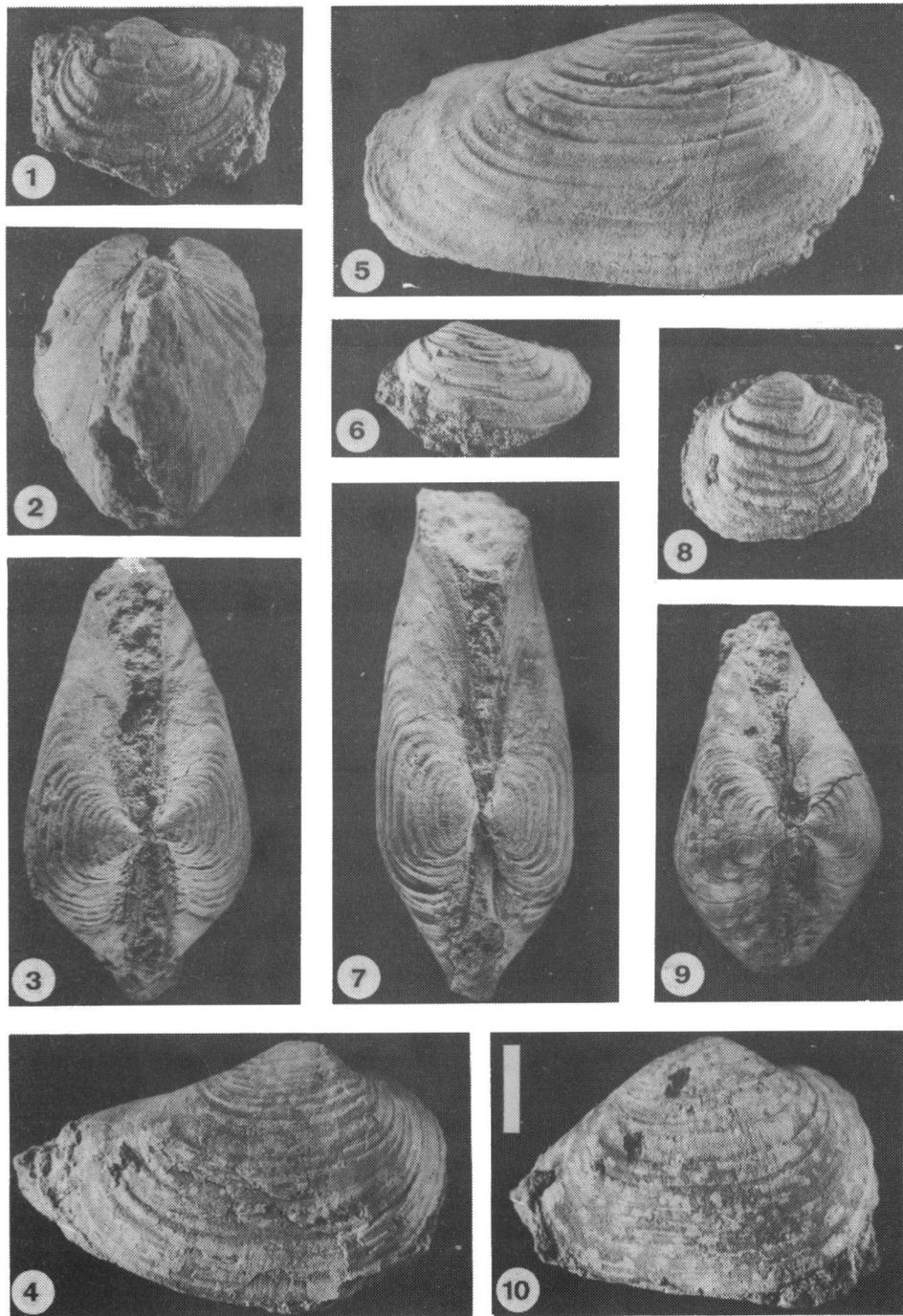
Panopea (Panopea) andreae sp. n.

1-2. Holotype ZPAL L. III/22, 1.-RV EM, 2.-view from the dorsal margin; 4.-RV EM, ZPAL L. III/4; 5.-LV EM, ZPAL L. III/20; 6.-RV EM, ZPAL L. III/6; 7.-RV EM, ZPAL L. III/10

Panopea (P) aff. worthingtoni Hutton

3. LV CM, ZPAL L. III/31

Scale bar 1 cm



Panopea (Panopea) andreae sp. n.

1. LV EM, ZPAL L. III/2; 2-3. CM ZPAL L. III/8, 2.-view from the anterior margin, 3.-view from the dorsal margin; 4.- RV EM ZPAL L. III/9; 8.-RV EM ZPAL L. III/3; 9-10. CM ZPAL L. III/5
9.-view from the dorsal margin, 10.-RV

Panopea (P.) aff. *worthingtoni* Hutton

5 and 7.-CM ZPAL L. III/32, 5.-RV, 7.-view from the dorsal margin; 6.-LV EM ZPAL L. III/1
Scale bar 1 cm

Type locality: Wrona Buttress, eastern part of King George Island, West Antarctica.

Derivation of the name: named in honor of Andrzej Gaździcki, geologist and member of many Polish Polar Expeditions.

Diagnosis. — *Panopea* having *Mya*-like shell sculptured with concentric folds, with a wide, deep and rounded sinus.

Material. — 29 bivalved external or composite moulds with partial shell preservation.

Dimension (in mm):

			L	La	H	C
ZPAL	L.III/22	RV EM	40.0	17.8	29.8	18.7
	L.III/2	RV EM	22.4	11.4	17.4	14.3
	L.III/3	LV EM	22.4	11.0	19.1	12.4
	L.III/4	LV EM	38.3	14.5	27.3	16.2
	L.III/5	LV CM	39.9	20.6	28.7	24.7
	L.III/6	LV EM	48.3	18.3	32.2	24.5
	L.III/8	LV CM	48.3	18.0	32.9	27.7
	L.III/9	LV EM	43.6	17.2	28.2	22.9
	L.III/10	LV EM	47.1	18.9	32.2	22.5
	L.III/20	LV CM	36.8	14.8	30.4	19.4

Abbreviations used: CM — composite moulds, EM — external moulds, LV — left valve, RV — right valve, L — length, La — length of anterior part of valve, H — height, C — convexity of conjoined valves.

Description: Shell is elongate, subtrigonal in outline, expanding and rounded anteriorly, tapering posteriorly, gaping at both ends. The gapes are small and narrow. Maximum convexity is at mid-length of weak, rounded ridge running from the beak anteroventrally. Small, acute beak is orthogyrate and considerably shifted anteriorly, with the anterior part of the shell accounting for 42% of the total length. Triangular umbonal part of the shell projects above the slightly concave dorsal margin and is marked by two ridges gradually declining ventrally. The posterior one, running from the beak posteroventrally is weaker, distinct only near the beak. External surface is covered with irregular commarginal folds variable in conspicuosness, densely spaced at the umbonal and anterior parts of the shell. Growth stages are indistinct. External ligament is placed at the very short and squeezed nympha. Hinge is relatively weak, with one cardinal tooth in each valve. The vertical, conoidal, slightly bent cardinal teeth are placed closely beneath the beaks; the tooth in the righth valve is placed more anteriorly than the tooth in the left one. Adductor muscle scars are indistinct, both of them oval in shape. Pallial sinus is deep, broad, extending always to a point almost below the beak (in the right valve occasionally even deeper), leaving a narrow space between its limb and the pallial line with which it may be confluent along a short distance. Pallial line is very distant from margins; its

anterior part is almost straight, divergent from the convex anterior margin. **Variation:** Variability mainly concerns shell proportions. Small-sized shells are less inequilateral, with their beaks slightly forward of the midline. Their commarginal folds are relatively stronger. They are slightly gaping posteriorly. The anterior gape appears in specimens over 40 mm in shell length. It is small and narrow.

Remarks: The specimens under discussion are almost entirely consistent with the one described by Ortmann (1902: 151, Pl. 3, Fig. 3) from the Lower Magellanian beds at Punta Arenas (Patagonia) under the name *Lutraria undatoides*. The latter species was established by Ortmann (1899) on the basis of a single small-sized, bivalved external mould. According to Pugaczewska (*in* Gaździcki and Pugaczewska 1984), Ortmann's species should be attributed to the genus *Panopea*. The present author's opinion is that the state of preservation of the specimen referred to by Ortmann does not allow for its generic identification. The shell characteristics are shared by several species having deep-burrowing habit and their generic attribution is based on hinge details. The investigated specimens from Wrona Butress, as well as those reported by Pugaczewska (*in* Gaździcki and Pugaczewska 1984) from the Polonez Cove Formation, represent the genus *Panopea*.

The species *P. (P.) andreae* sp. n. resembles Ortmann's species but differs from the latter in its outline being subtriangular with irregularly convex ventral margin and straight but oblique posterodorsal margin. On the other hand, the shell of *L? undatoides* is oval in outline with regularly arched ventral margin and straight posterodorsal margin.

The species *P. (P.) andreae* sp. n. approximates *P. clausa* Wilcknes, 1910, from which it differs in its more triangular shell with the umbonal part being better defined, more projected above the dorsal margin and having two umbonal-ventral ridges. Moreover, commarginal folds in *P. (P.) andreae* sp. n. are more projected and more rarely spaced than in *P. clausa*.

Stratigraphic distribution: *Panopea (P.) andreae* sp. n. has previously been reported from the Polonez Cove Formation on King George Island under the name *Panopea cf. undatoides* (Ortmann, 1902) *cf.* Gaździcki and Pugaczewska (1984).

Polonez Cove Formation (Lower Oligocene; *see* Gaździcki and Pugaczewska 1984, Gaździcki 1989) — Destruction Bay Formation (Early Miocene; *this paper*).

Panopea (Panopea) aff. worthingtoni Hutton, 1973
(Pl. 2, Fig. 3; Pl. 3, Figs 5–7)

Material. — 4 bivalved external or composite moulds.

Dimension (in mm):

		L	La	H	C
ZPAL L.III/1	RV EM	20.8	6.2	13.1	10.7
L.III/31	LV CM	46.2	15.4	24.4	18.8
L.III/32	LV CM	59.2	22.7	30.8	23.0

Remarks: All 33 specimens derived from the lowermost unit exposed in Wrona Buttress (Pl. 1, Fig. 1) were at first regarded by the present author as representative of a single species. The observed diversity in shell outline and convexity as well as differences in gape between the valves might be supposed to represent a feature of the species and fall within the range of intraspecific variability. To substantiate this statement, biometrical approach has been introduced, based on measurements of valve length, height, length of anterior part, and shell convexity. The coefficients of the linear regression for the 17 left valves representing more triangular forms are as follows:

$$La = 0.31L + 3.42, H = 0.58L + 1.94, C = 0.42L + 2.36$$

while for the left valves more oval in outline:

$$La = 0.42L - 3.06, H = 0.47L + 2.72, C = 0.33L + 3.17$$

F-test does not allow to reject (at the level of $\alpha = 0.05$) the hypothesis that regression coefficients are the same, which would imply that the samples may represent a single population. The samples, however, are too small (and hence, the confidence intervals are too wide) to regard this result as more than tentative.

Because the results of the F-test are not sufficiently unequivocal to regard the observed variability as intraspecific, it seems reasonable to accept the presence of two species in the considered pool of specimens, viz. *P. (P.)* aff. *worthingtoni* Hutton, 1873 and *P. (P.) andreae* sp. n. Based on drawings of Hutton's species figured by Fleming (1966, Pl. 63, Figs 710–712), the oval-shaped specimens from Wrona Buttress are almost indistinguishable from those described by Hutton from New Zealand. The species *P. (P.) worthingtoni* was widespread in New Zealand since the Early Eocene until the Middle Miocene.

The specimens of *P. (P.)* aff. *worthingtoni* differ from those of *P. (P.) andreae* sp. n. in their relatively smaller height, less distinct umbonal part and weaker beaks. The shell of the former species show smaller but more uniform convexity (cf. Pl. 3, Fig. 7 and Pl. 3, Fig. 3), their posterodorsal margin being less convex and the outline being more oval than in shells of *P. (P.) andreae* sp. n.

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Streszczenie

W pracy opisano nowy gatunek małża *Panopea (Panopea) andreae* sp. n. (pl. 1, fig. 4; pl. 2, fig. 1–2, 4–7; pl. 3, fig. 1–4, 7–10) pochodzący z miocenijskich osadów formacji Destruction Bay Wyspy Króla Jerzego (Szetlandy Południowe, Antarktyka Zachodnia) zob. fig. 1. Zdaniem autorki okazy z oligocenijskich osadów formacji Polonez Cove znane pod nazwą *P. cf. undatoides* (Ortmann) powinny być włączone do nowo ustanowionego gatunku.

Zespół małżów z Wrona Buttress (pl. 1, fig. 1) poza *P. (P.) andreae* sp. n., najliczniejszym gatunkiem w opracowanym materiale, obejmuje ponadto: *Eurhomalia cf. antarctica* (Shermann and Newton, 1897) (pl. 1, fig. 5), *E. cf. newtoni* (Wilcknes, 1911) (pl. 1, fig. 2 i 3) oraz *Panopea (Panopea) aff. worthingtoni* Hutton, 1873 (pl. 2, fig. 3; pl. 3, fig. 5–7).

Przedstawione w pracy okazy małżów są przechowywane w Instytucie Paleobiologii PAN w Warszawie.