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HOMOLODROMIID CRABS FROM THE CAPE MELVILLE FORMATION (LOWER MIOCENE) OF KING GEORGE ISLAND, WEST ANTARCTICA

(Plates 36—43)



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More than 280 remains morphologic of the crabs *Antarctidromia inflata* FÖRSTER, 1985 have been collected from the Lower Miocene Cape Melville Formation of King George Island (South Shetland Islands, West Antarctica). The excellent preserved specimens allow a detailed analysis. The pattern of the carapace shows closer relationships to Jurassic Prosopidae from the Bathonian than to the two Recent genera: *Homolodromia* and *Dicranodromia*. *A. inflata* appears to have been adapted to a low-energy environment cool and deep water on the outer shelf in high latitudes.

Key words: Homolodromiid crab, taxonomy, paleoecology, Lower Miocene, South Shetland Islands, Antarctica.

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KRABY HOMOLODROMIDOWE Z OSADÓW FORMACJI CAPE MELVILLE (DOLNY MIOCEN) WYSPIY KRÓLA JERZEGO, ANTARKTYKA ZACHODNIA

Streszczenie. — Praca jest taksonomicznym studium krabów z gatunku *Antarctidromia inflata* FÖRSTER, 1985. Bogata kolekcja licząca ponad 280 okazów pochodzi z lodowcowo-morskich osadów dolnomioceńskiej formacji Cape Melville na Wyspie Króla Jerzego (Szetlandy Południowe, Antarktyka Zachodnia). Doskonały stan zachowania pancerzy krabów pozwolił na ich szczegółową analizę morfologiczną i porównanie z kopalnymi i współczesnymi przedstawicielami rodziny Dromiidae. Wykazują one większe podobieństwo do najstarszych przedstawicieli Prosopidae znanych z batonu niż do współcześnie żyjących z rodzajów *Homolo-*

dromia i *Dicranodromia*. Stwierdzono, że zasiedlały one obszary zewnętrznego szelfu w strefie proglacjalnej.

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INTRODUCTION

Crab-rich locality — the Crab Creek, discovered on King George Island in the South Shetland Islands archipelago by Polish field party during the 1980—1981 austral summer, provided a collection of over 280 specimens of first Tertiary homolodromiid crab (GAŹDZICKI and WRONA 1982, FÖRSTER *et al.* 1985).

Glacio-marine sediments of the Cape Melville Formation which yield studied homolodromiid crabs occur in the easternmost part of King George Island, the Melville Peninsula (fig. 1). The Cape Melville Formation (up to 200 m thick) is represented by fossiliferous marly shales with siltstones, marls and sandstones intercalations. This sequence which also yielded ice-rafted dropstones of Antarctic landmass provenance, gives evidence a continental glaciation called the Melville Glaciation (BIRKENMAJER 1982, 1984, 1987 this volume). The radiometric K-Ar data (around 20 Ma) obtained from the two andesite dykes cutting through glacio-marine sediments of the Cape Melville Formation allow to estimate the age of the formation as not younger than the Early Miocene (BIRKENMAJER *et al.* 1985). Taking into account that the Destruction Bay Formation which underlays the Cape Melville Formation yielded the Early Miocene brachiopod fauna, an Early Miocene age is suggested for the Cape Melville Formation and the Melville Glaciation (BIERNAT *et al.* 1985, BIRKENMAJER *et al.* 1985).

The field work in Antarctica was undertaken during the Fifth Polish Antarctic Expedition 1980—1981 led by Professor K. BIRKENMAJER.

The collection of crabs is housed at the Institute of Paleobiology of the Polish Academy of Sciences in Warszawa, Poland (abbreviated as ZPAL).

Acknowledgements. — The field work on King George Island was supported by the Polish Academy of Sciences (Research Project MR. I. 29). The SEM photomicrographs were taken at the Institut für Paläontologie, Universität Erlangen-Nürnberg, while one of the authors (A. G.) was on a fellowship granted by the Alexander von Humboldt-Stiftung (Bonn).

MATERIAL AND MODE OF PRESERVATION

The homolodromiid crabs of the species *Antarctidromia inflata* and crab burrows occur in marly shales of the upper part of the Cape Melville Formation exposed on the top of the peninsula plateau in the Crab Creek area (fig. 1). Associated fossils include diatoms (mostly centric), radiolarians, chrysomonads, agglutinated and calcareous benthic foraminifers, numerous solitary corals (*Flabellum*), bryozoans, bivalves, gastropods, scaphopods, polychaetes, ostracods, echinoids and a few fish remains. This Tertiary fossil assemblage is an autochthonous biota often occurring in live orientation (GAŹDZICKI and WRONA 1982, BIRKENMAJER *et al.* 1983, see also RONIEWICZ and MORYCOWA 1985, 1987 this volume; KAR-CZEWSKI 1987 this volume, SZANIAWSKI and WRONA 1987 this volume, JESIONEK-SZYMAŃSKA 1987 this volume). Furthermore occur recycled fossils include Cretaceous calcareous nanoplankton (DUDZIAK 1984) and belemnites (BIRKENMAJER *et al.* 1987, this volume).

The studied crab collection consists of approximately 200 nearly complete or almost complete carapaces and 80 fragments as abdominal segments, appendages or chelae (pls. 36—41; Fig. 9). Most specimens of *Antarctidromia inflata* found *in situ* are preserved in a life-

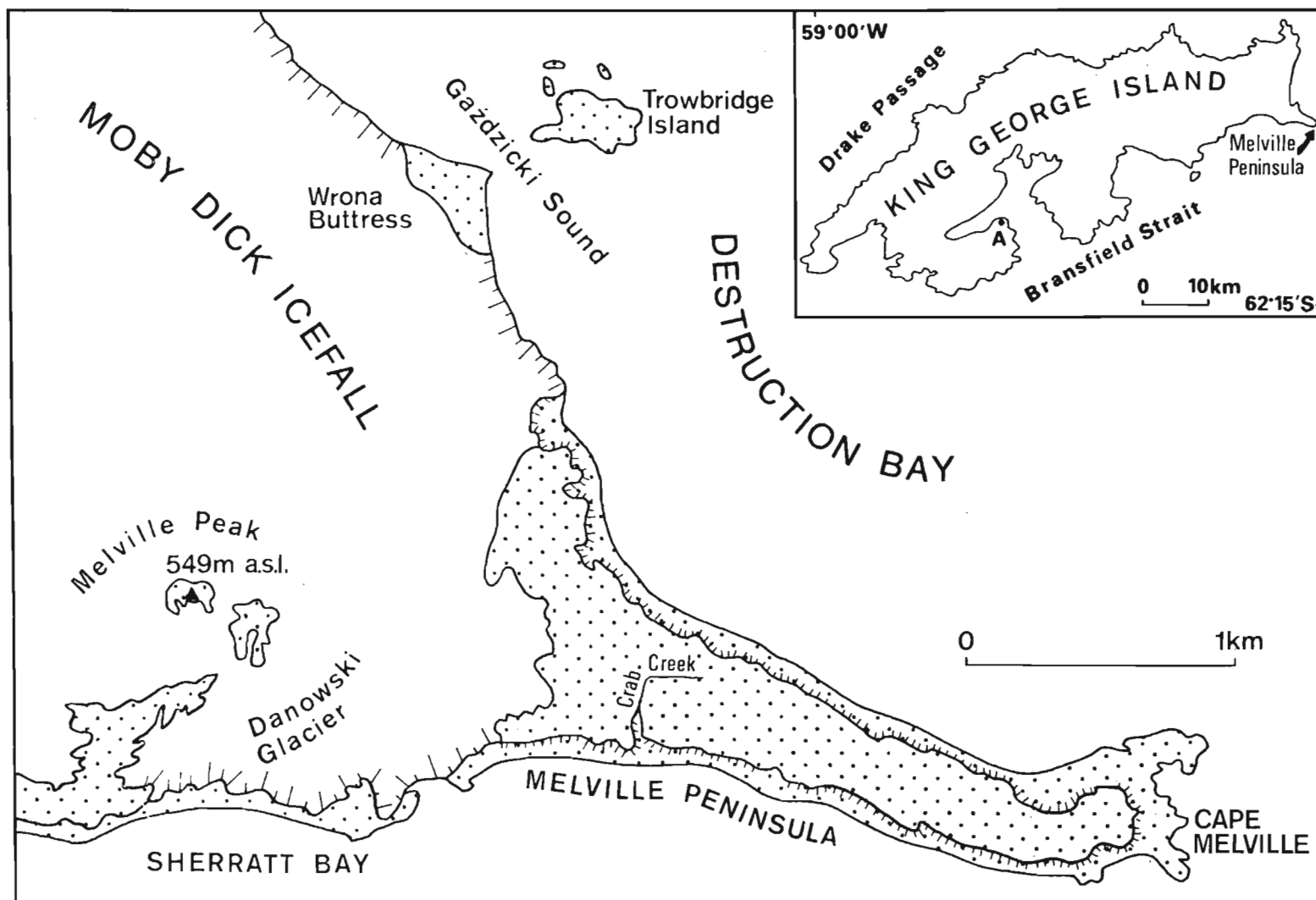


Fig. 1

Location of the Melville Peninsula in King George Island and Crab Creek on the Melville Peninsula. Dotted areas show distribution of the Tertiary rocks of the Moby Dick Group (modified from BIRKENMAJER 1982). A — Polish Antarctic Station ARCTOWSKI.

like attitude with the dorsal parts uppermost, the chelipeds folded ventrally against the buccal cavity and the ambulatory legs in a walking arrangement. Although many carapaces are slightly crushed, most are remains of dead animals rather than moults. Carapaces, external and internal skeletons and sutures had been weakened by post-mortem decalcification and deformed early diagenetically during compaction of the enclosing sediment. The most perfectly preserved specimens occur within compact marly limestone concretions which formed within the sediment. Crab remains appear to have served as nuclei for diagenetic processes producing the concretions. Most intensive cementation occurred in the ventral regions of the crabs, particularly around the abdomen, the pleural sutures and proximal to the joints of the appendages. Sediments enclosing the dorsal parts of the carapace or the chelae are weakly cemented. Stronger calcified regions with less pores and natural openings for diffusion, remained less cemented than regions with many sutures. Weakly calcified parts, favoured better chemical interchanges between decomposing organic material and enclosing sediment. Cementation however increases dorsally with increasing amount of crushing. Remains preserved in shales and marls are usually less complete and often heavily crushed. Not only the carapaces, but even the appendages have then been deformed dorsoventrally.

Many specimens of *Antarctidromia inflata* have a remarkably well-preserved cuticle (pl. 42 : 1). External cuticles are black to brownish, in weathered specimens commonly bluish white or brownish white. In thin sections they are brown to amber. Examined with the scanning electron microscope the cuticle reveals a gross structure similar to that of extant decapods. A thin unlamellated layer is probably equivalent to the epicuticle of living decapods. The main layer is finely laminated (pl. 42: figs. 1—3) and is equivalent to the calcified zone of the endocuticle. Occasionally it contains small clusters of pyrite, particularly in vugs (pl. 42 : 4).

Only a few specimens show distinct indications of decomposition and transport: mostly the ventral skeleton with the appendages had been shifted, but rarely more than half of the width of the carapace and always laterally (ZPAL Cr. 1/60, 96, 122). In one dislocated concretion (ZPAL Cr. 1/127) carapace and abdomen are juxtaposed. The abdomen rotated approximately 180° around the carapace (pl. 37 : 6). There are few examples of clustered assemblages. In few cases crabs *Antarctidromia* and the corals *Flabellum* were found together. These few examples, as well as disintegrated specimens and even single, isolated appendages, are rare (< 20%), in comparison with other occurrences of fossil decapods. This may be the result of selective fossilization as well as selective collecting related to different weathering of fossils from shales or concretions on the eroded bedding-plane. In summary, all fossil components display little or no post-mortem disturbance reflecting an *in situ* faunal association. The life-like positions of many fossil crabs suggest rapid burial, perhaps induced by storm-generated fine-grained sediment (see discussions below).

PALEOECOLOGICAL REMARKS

The life-like attitude of many specimens of *Antarctidromia* indicates that these animals were already buried while still alive. The occurrence in spheroidal and ellipsoidal concretions is the result of decomposition of the dead animals, entombed in the sediment. The sub-cylindrical burrows are associated with the crabs and they often weather out on the flat lying bedding-plane and erosional surface on the top of the Melville Peninsula (pl. 43 : 1). The burrows are usually subcircular in transversal section (pl. 43 : 2—3) and 3—10 cm wide and up to 100 cm long. They are more or less straight or gently curved, somewhat widening towards the end (pl. 43 : 5—6). The burrows form mainly horizontal tunnels in the bedding-plane without branching or arrangements in galleries (pl. 43 : 1). Occasionally a crab was found within a burrow

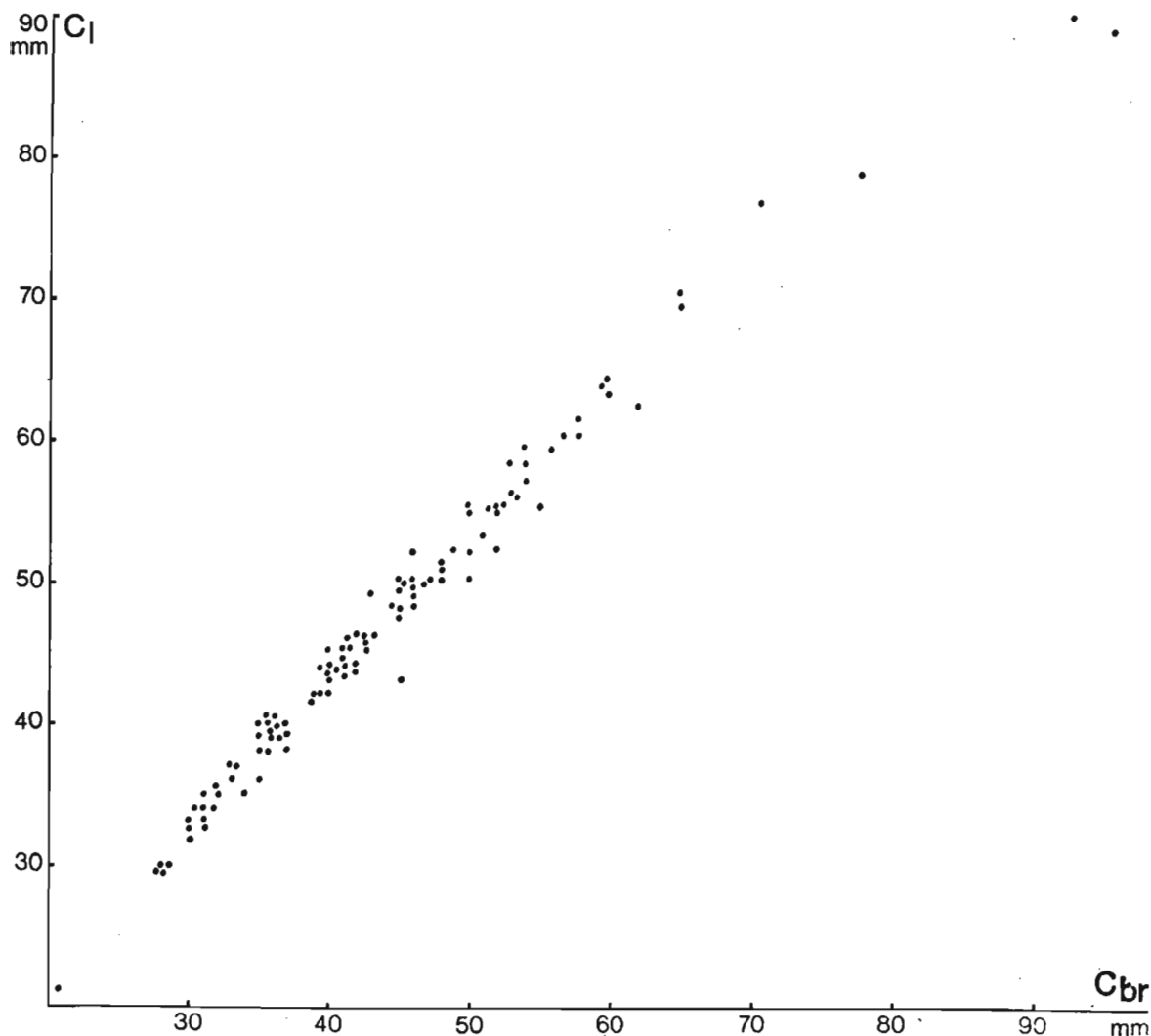


Fig. 2

Relation of length (C_l) and width (C_{br}) of carapace of 109 measured specimens; note gradual change in shape to wider carapaces in larger individuals.

(pl. 43 : 4). The association of crabs with burrows may indicate that the crabs are autochthonous or parautochthonous relics of an ancient community.

The biology of Recent Homolodromioidea is insufficient known to indicate whether the burrows definitively represent dwelling structures which the animals maintained and occupied or if the burrows served simply as occasional refuge, particularly during the vulnerable soft-shelled phase after moulting. The numerous remains of *Antarctidromia* without any relationship to burrow structures, however, as well as the absence of distinct moults suggest that these crabs may have lived in semi-permanent burrows or that they have been able to rapidly bury themselves for protection in soft muddy bottoms as known from closely related Recent Dromiidae.

The suggestion that the crabs are relics of ancient communities is strengthened by the occurrence of apparently all growth stages, from juvenile individuals of only 25 mm length to adults of about 99 mm length (fig. 2). But there is an evident preponderance of carapaces less than 50 mm length. Furthermore there seems to be a notable inequality in the ratio of males to females. According to the narrow shape of nearly all observed abdomens, males seem to be

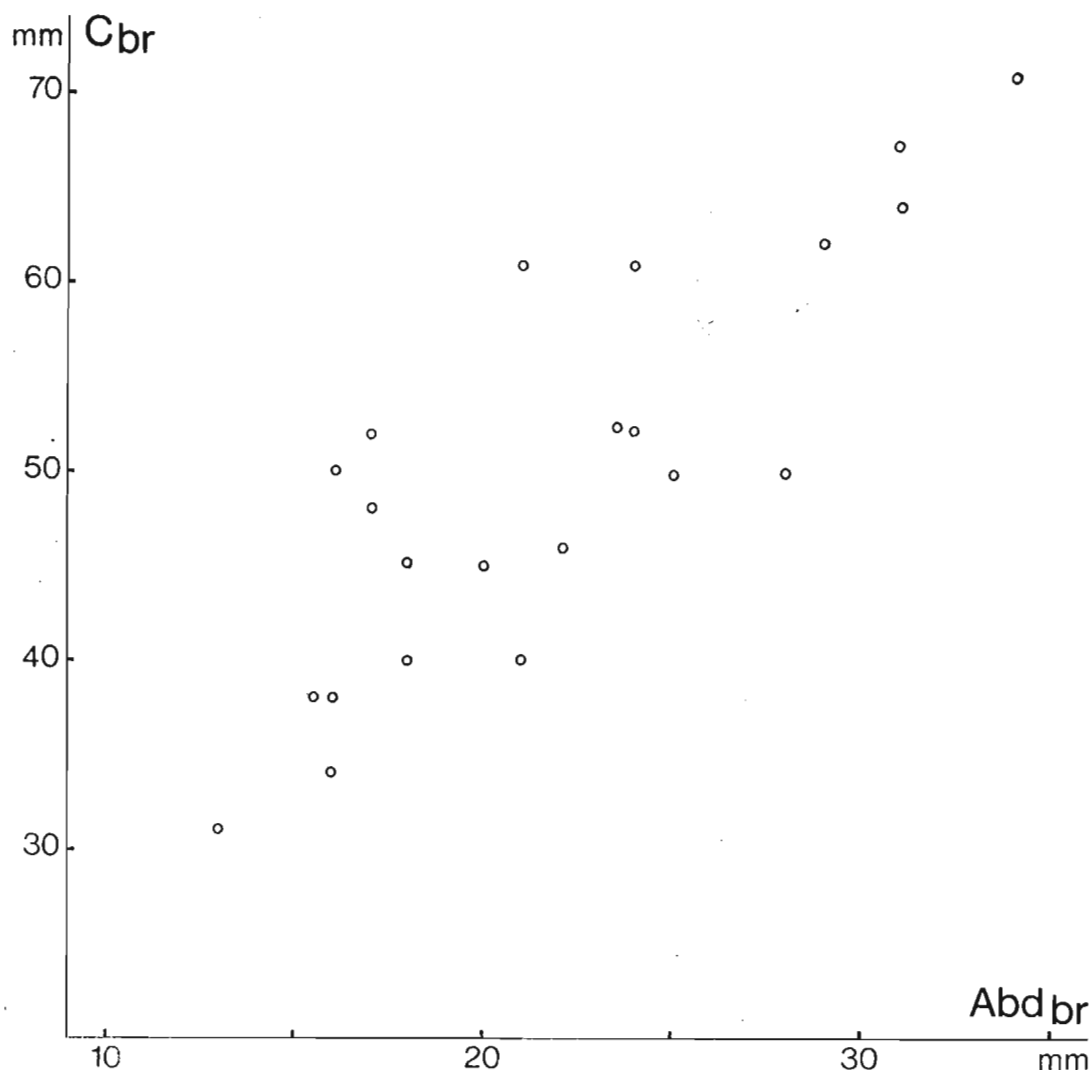


Fig. 3

Relation of width of carapace (C_{br}) and abdomen (Abd_{br}). The 22 measured specimens show a scattered but no bimodal frequency distribution.

more abundant than females. Females should show more broadly oval abdomens for the protection of the eggs, as known from Recent crabs. Unfortunately, in no specimen the genital openings have been observed at the coxae of the third to fifth pereopods. Minor differences in the shape of the abdomen appear in specimens which are longer than 50 mm (fig. 3). The differences increase with size, but do not reach an obvious bimodal frequency distribution. In Recent crabs a clearly bimodal distribution is realized only in communities of adult individuals. Only 22 specimens (8%) have carapace and abdomen sufficiently preserved. Detailed morphologic analysis of the total fauna and comparison with Recent homolodromiid crabs suggest, that the fauna represents a life assemblages of juvenile and half-grown individuals. The occurrence of solitary corals preserved in life position in the same bedding-plane, may indicate an *in situ* life assemblage, buried suddenly by a blanket of sediment.

All Recent Homolodromioidea inhabit preferably soft muddy bottoms in deeper water of at least 150 m depth. *Dicranodromia mahyeuxi* MILNE-EDWARDS for example, has been dredged from more than 1100 m depth. The abundance of ahermatypic corals of the genus *Flabellum* LESSON therefore is of particular interest as a depth indicator (RONIEWICZ and MORYCOWA

1987 this volume). Comparable to the ecological displacement of the homolodromiid crabs since Cretaceous times, the Caryophyllidae show a resembling retreat to bathyal environments and to higher latitudes since Jurassic times (WELLS 1967). Recent species of the genus *Flabellum* range from shallow water to more than 3000 m depth (WELLS 1967, see also RONEWICZ and MORYCOWA 1987, this volume), often with narrow depth limits for a single species. But the distribution of Recent ahermatypic corals is much more controlled and limited by the temperature of the water at the bottom than by depth (WELLS 1967). The common occurrence of glacially-striated erratic blocks (up to 2 m in diameter), interpreted as iceberg-rafted dropstones (BIRKENMAJER *et al.* 1983) points to a cold water environment in high latitudes. The association of crabs, ahermatypic corals, and the whole biotic assemblage suggests a deeper outer shelf environment.

SYSTEMATIC DESCRIPTION

Subsection **Dromiacea** DE HAAN, 1833
 Superfamily **Homolodromioidea** ALCOCK, 1899
 Genus *Antarctidromia* FÖRSTER, 1985
Antarctidromia inflata FÖRSTER, 1985
 (pls. 36—41; figs. 2—8)

1982. Majidae — GAŹDZICKI and WRONA; 402; figs. 8a, b.

1983. Dromiacea — BIRKENMAJER, GAŹDZICKI and WRONA; 58, figs. d, e.

1985. *Antarctidromia inflata* — FÖRSTER, GAŹDZICKI and WRONA; 342, figs. 2—4.

Material. — Over 280 specimens (ZPAL Cr. I/1—280).

Measurements (in mm):

	L	W	L/W	LG	LG/L
ZPAL Cr. I/6	99	92	1.08	40	0.41
ZPAL Cr. I/1	76	71	1.07	33	0.43
ZPAL Cr. I/2	57	54	1.06	25	0.44
ZPAL Cr. I/3	49	46	1.07	22	0.45
ZPAL Cr. I/4 (holotype)	33	31	1.07	15	0.45
ZPAL Cr. I/203	21	20	1.05	9.7	0.46

L — length of carapace measured from exorbital tooth to posterior margin; W — width of carapace; LG — length of gastric region (= distance exorbital tooth — median cervical groove).

Description. — Carapace longer than wide (L/W 1.07, see fig. 2), pearshaped with greatest width and height in posterior third. Dorsal surface moderately convex, bent downwards anteriorly. Sharp lateral margin, starting from exorbital tooth (ES) and expiring on posterior part of branchial region.

Frontal region narrow, cut into three teeth: a pair of strong preorbital (lateral frontal) spines (PrS) and a median frontal spine (FS). Frontal spine directing obliquely downwards, preorbital spines upwards/outwards (figs. 4—6). Preorbital spines on outer edge armed by minute spines (fig. 4). Narrow antennoorbital cavity, dorsally protected by frontal (FS), preorbital (PrS) and a minute exorbital spine (ES), ventrally by a small infraorbital spine (IS) and epistome (ep) (fig. 6).

Carapace widening from exorbital tooth (ES) which corresponds with the antero-external angle of the buccal cavity. Anterolateral margin concave in outline with two spines: a small

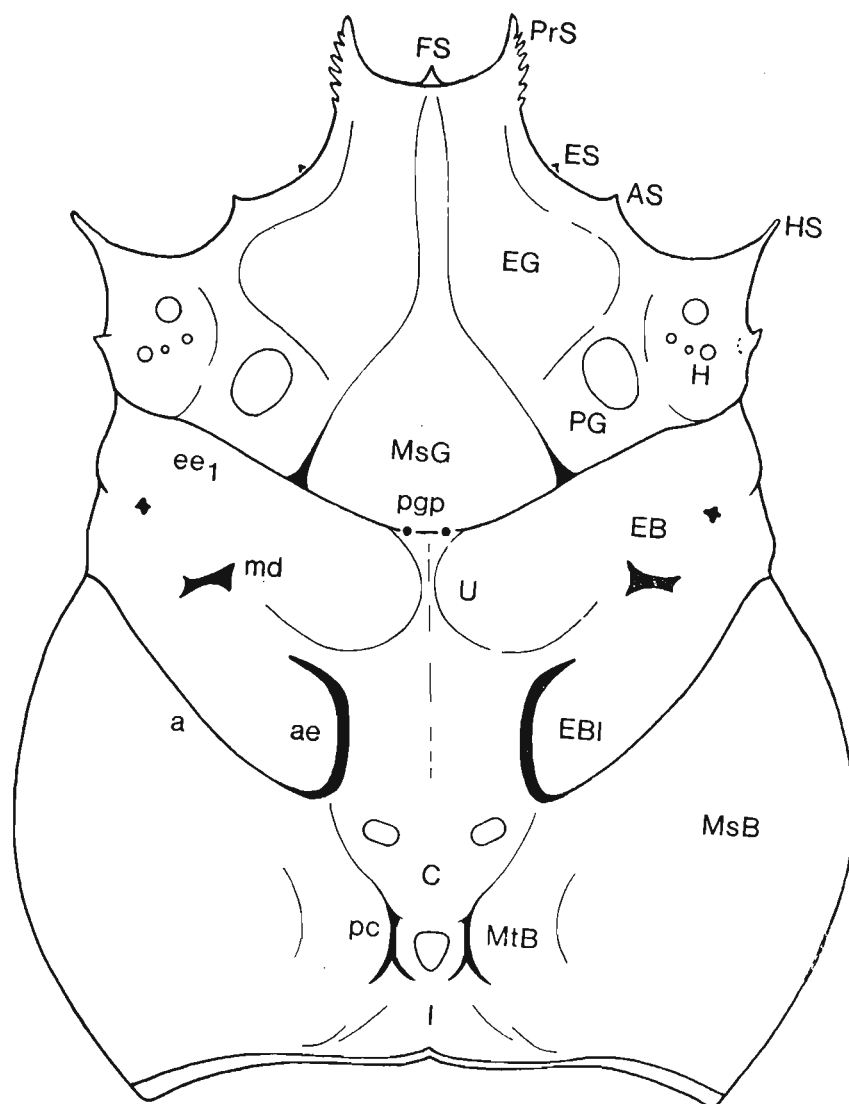


Fig. 4

Antarctidromia inflata FÖRSTER; terminology of carapace regions and grooves; *a* branchiocardiac groove, *ae* attachment area of attractor epimeralis muscle, *AS* antennal spine, *ee*₁ cervical groove, *EB* epibranchial region, *EBI* epibranchial lobe, *ES* exorbital tooth, *FS* frontal spine, *H* hepatic lobe, *HS* hepatic spine, *md* median dorsoventral muscle, *MsG* mesogastric lobe, *MsB* mesobranchial region, *MtB* metabranial region, *pc* posterior cardiac marking, *PG* proto-gastric lobe, *pgp* posterior gastric pits, *PrS* preorbital spine, *U* urogastric region.

antennal spine (*AS*) about half between exorbital (= supraorbital BALSS 1940) and the prominent hepatic (anterolateral spine IHLE, 1913) (*HS*) at the anterolateral angle of carapace. Two small bosses just behind hepatic spine, anterior of cervical groove. Carapace posterior the branchiocardiac groove significantly widening, forming a more or less symmetrical convex arch to posterior margin. Posterior margin sinuate.

Cervical (*ee*₁) and branchiocardiac (*a*) grooves well developed. Both grooves cross lateral margin and join with antennal (*b*) and hepatic (*b*₁) groove. A zone of weakness (1) accompanies the grooves ventrally, ascending backwards against the lateral margin and expires on the posterior branchial region. It may be comparable to the linea dromica of Recent Dromiidae. Cervical groove with posterior gastric pits (*pgp*). Conspicuous lateral gastrocardiac (*ae*), median dorsoventral (*md*) and posterior cardiac (*pc*) markings.

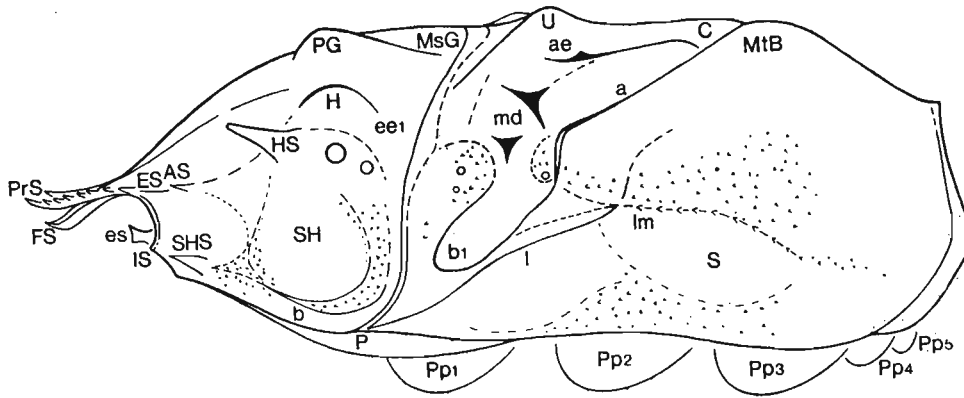


Fig. 5

Antartidromia inflata FÖRSTER; lateral view of carapace; *AS* antennal spine, *C* anterior boss of cardiac region, *ES* exorbital tooth, *FS* frontal spine, *H* boss of hepatic region, *HS* hepatic (anterolateral) spine, *IS* infraorbital spine, *MsG* mesogastric region, *MtB* metabranchial region, *P* „pterygostomial” region, *PG* boss of protogastric region, *PrS* preorbital spine, *Pp*₁₋₅ pereiopods 1 to 5, *S* lateral flank below lateral margin, *SH* subhepatic region, *SHS* subhepatic spine, *U* submedian bosses of urogastric region; *a* branchiocardiac groove, *ae* lateral gastrocardiac marking, *b* antennal groove, *b*₁ hepatic groove, *ee*₁ cervical groove, *es* eye stalk, *l* zone of weakness homologous of lineae dromica, *lm* lateral margin, *md* median dorsoventral muscle marking.

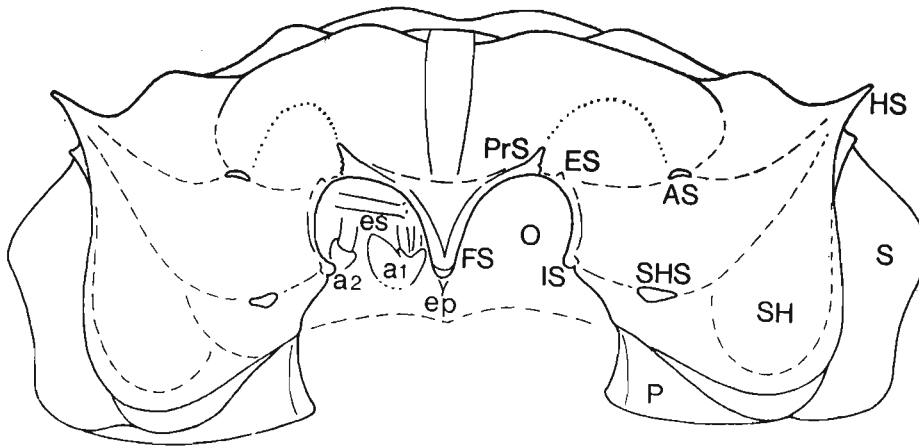


Fig. 6

Antartidromia inflata FÖRSTER; frontal view; terminology see fig. 4; *a*₁ antennula, *a*₂ antenna, *es* eye stalk, *ep* epistome, fused with frontal spine, *O* antennoorbital cavity.

Mesogastric lobe (MsG) flattened, epi/protogastric lobes (EG, PG) inflated. Pronounced bosses on posterior protogastric (PG) and hepatic (H) lobes, arranged on a transverse line with hepatic spine (HS) approximately parallel with cervical groove (ee₁). Inflated bilobed urogastric region (U). Depressed narrow cardiac region (C), expanded and inflated posterior into an equilateral triangle. Triangle ornamented by small bosses at each apex. A weak longitudinal ridge runs from the cervical groove into the cardiac region. Epibranchial region (EB) bounded by cervical (ee₁) and branchiocardiac (a) grooves and gastrocardiac markings (ae). Mesobranchial (MsB) and metabranchial (MtB) regions confluent, gently convex with a slight kidney-shaped elevation parallel to posterior cardiac markings (pc). Depressed intestinal region (I) with a pair

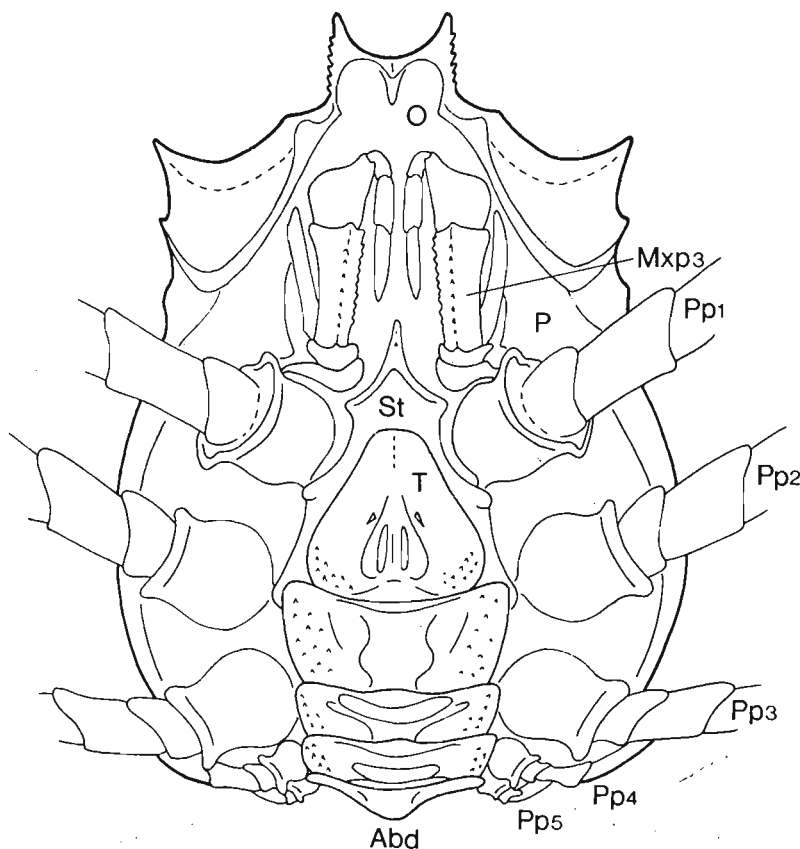


Fig. 7

Antarctidromia inflata FÖRSTER; ventral view; *Abd* abdomen, *Mxp*₃ third maxilliped, *O* antenno-orbital cavity, *P* pterygostomial region, *Pp*₁₋₅ pereopods 1 to 5, *St* sternum, *T* telson.

of weak, backwards diverging ridges. Subhepatic region (SH) flattened to depressed, ventral upturned into a marginal rim along antennal (b) and cervical (ee₁) grooves and divided by another approximate vertical rim into two areas (fig. 5).

Entire surface of carapace ornamented by small granules except for grooves and markings. Posterior branchial region with some single tubercles.

Abdomen infolded against sternum. First two segments visible from dorsal side. Both reduced in breadth to allow a dorsal position of the last two pereopods. Well developed pleura, distinctly delimited from the median arch of the tergum. Second an especially sixth somite lengthened (fig. 7). Sixth somite without marginal „intercalar plates” developed in the Dromiidae or Dynomenidae. Large subtriangular telson.

Thoracic sterna 1 to 3 fused to a narrow triangular projection (fig. 8). Median bosses as remnants of somite boundaries. Posterior-lateral projections (episternum) (est₃₋₆) form the ventral supports for the articulation of the third maxillipeds and pereopods. In sterna 4—6 transverse grooves as remnants of somite boundaries.

Third maxillipeds (Mxp₃) cover mouth parts in buccal cavity; subpediform and strongly calcified. Basis and ischium fused; long, and rounded-triangular in cross-section. One outer and two inner edges. Ventral edge armed by strong spines (fig. 7).

First pereopods with chela. Ambulatory legs with dactyli only. Last two pereopods with subchela, probably for covering the carapace with sheltering objects as Recent Dromiacea use to do. Fourth and fifth pereopods reduced in size to about half of the length of

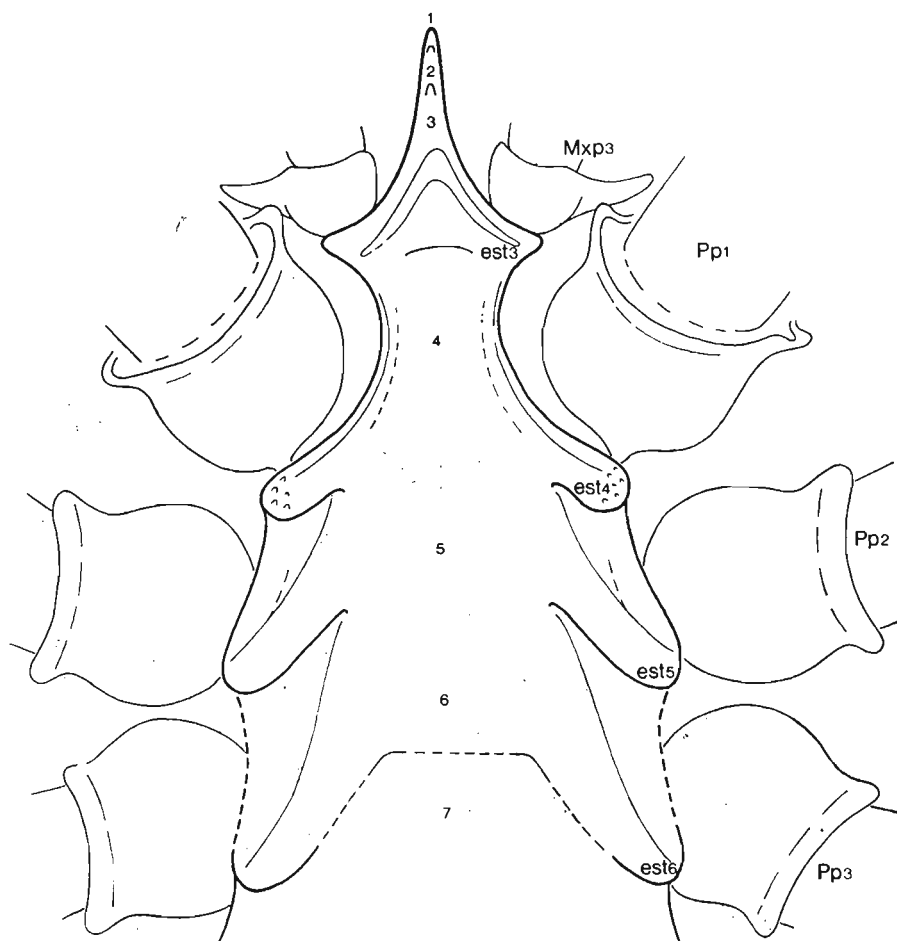


Fig. 8

Antarctidromia inflata FÖRSTER; sternum; thoracic sterna 1 to 3 fused to a narrow triangular projection; median bosses as remnants of somite boundaries; posteriolateral projections („episternum”) form the ventral supports for articulation of *Mxp*₃ and pereopods; transverse grooves as remnants of somite boundaries in somite 4 to 6; *est*₃₋₆ episternum 3 to 6, *Mxp*₃ third maxilliped, *Pp*₁₋₃ pereopods 1 to 3.

preceding legs (length of meri $Pp_4 : Pp_3 = 0.46$; $Pp_5 : Pp_3 = 0.40$). Both shifted to a sub-dorsal position. Proximate limbs of pereopods rounded-triangular in cross-section. Edges armed by strong spines. Chelae slender, subequal. Shorter than carapace ($L : Schl = 1.1-1.4$). Palms compressed with rounded dorsal and ventral edges. Fingers elongated, approximately as long as palm, and slightly curved outwards. Cutting edges with small rounded uniform teeth. Palms ornamented by small granules, resembling carapace and abdomen. Granules of outer face tend to be arranged in longitudinal lines.

Remarks. — The closest relationships show some recently discovered homolodromiid crabs from the Late Eocene (La Meseta Formation) of Seymour Island, east of James Ross Island, West Antarctica (FELDMANN 1985 written communication). There are close relationships to some of the oldest Prosopidae as *Prosopon mammillatum* (WOODWARD) and *P. au-duini* (DESLONGCHAMPS) from the Bathonian. The carapaces of these prosopids show a pattern of differentiation close to that of *Antarctidromia* (FÖRSTER *et al.* 1985, fig. 4). The two extant genera *Homolodromia* and *Dicranodromia* show less similarities.

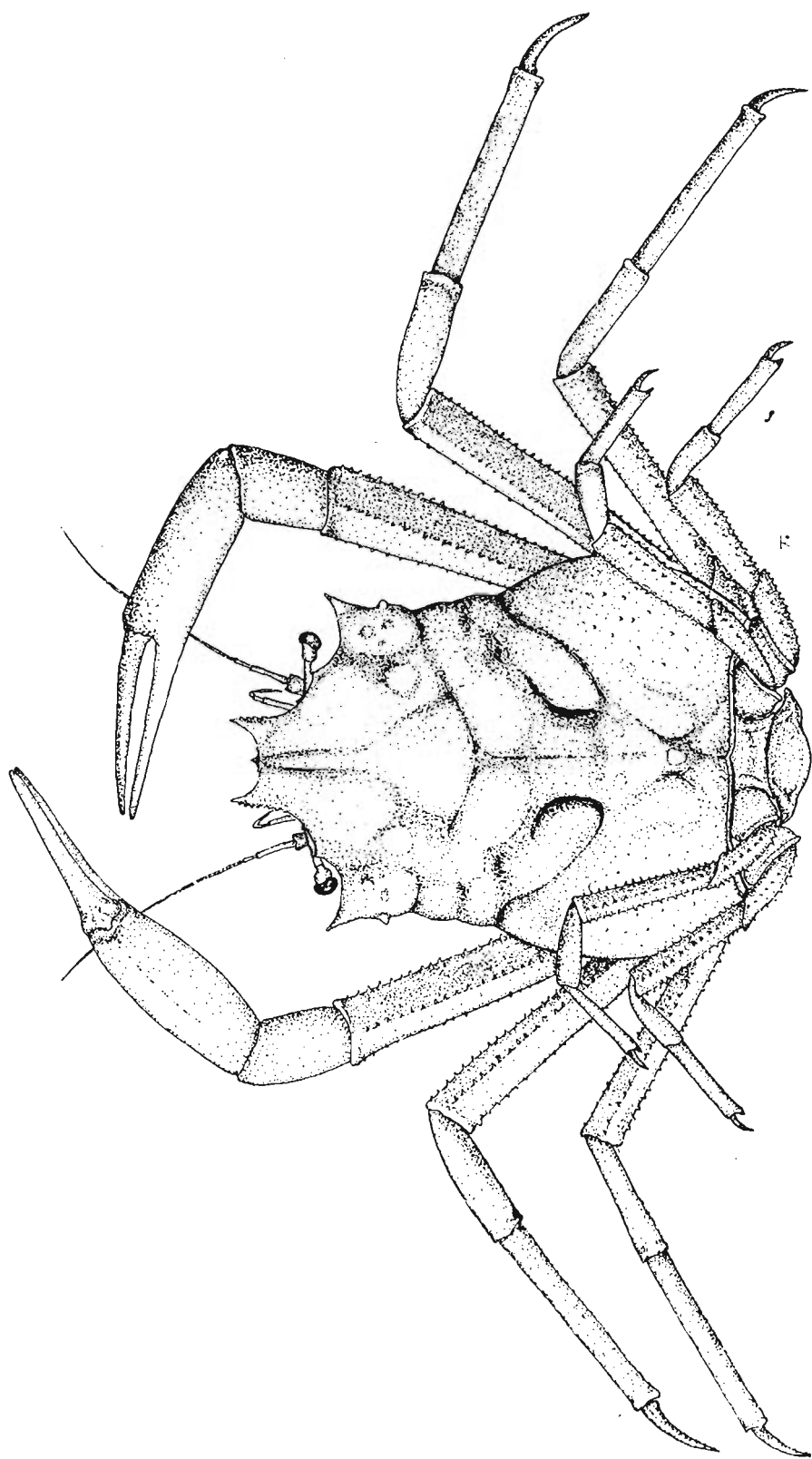


Fig. 9
Antarctidromia inflata FÖRSTER; reconstruction.

REFERENCES

- BALSS, H. 1940—1961. Decapoda. In: Bronn's Klassen und Ordnungen des Tierreichs. Leipzig.
- BIERNAT, G., BIRKENMAJER, K. and POPIEL-BARCZYK, E. 1985. Tertiary brachiopods from the Moby Dick Group of King George Island (South Shetland Islands, Antarctica). — *Stud. Geol. Polonica*, **81**, 109—141.
- BIRKENMAJER, K. 1982. Pre-Quaternary fossiliferous glacio-marine deposits at Cape Melville, King George Island (South Shetland Islands, West Antarctica). — *Bull. Acad. Polon. Sci., Terre*, **29**, 331—340.
- 1984. Geology of the Cape Melville area, King George Island (South Shetland Islands, Antarctica): Pre-Pliocene glaciomarine deposits and their substratum. — *Stud. Geol. Polonica*, **79**, 7—36.
- 1987. Oligocene-Miocene glacio-marine sequences of King George Island (South Shetland Islands), West Antarctica. In: A. GAŹDZICKI (ed.), *Palaeont. Results Polish Antarctic Expeds. I.* — *Palaeont. Polonica*, **49**, 9—36.
- , GAŹDZICKI, 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. Acad. Pol. Sc., Earth Sci.*, **33**, 15—23.
- , —, PUGACZEWSKA, H. and WRONA, R. 1987. Recycled Cretaceous belemnites in Lower Miocene glacio-marine sediments (Cape Melville Formation) of King George Island (South Shetland Islands) West Antarctica. In: A. GAŹDZICKI (ed.), *Palaeont. Results Polish Antarctic Expeds. I.* — *Palaeont. Polonica*, **49**, 49—62.
- DUDZIAK, J. 1984. Cretaceous calcareous nannoplankton from glacio-marine deposits of the Cape Melville area, King George Island (South Shetland Islands, Antarctica). — *Stud. Geol. Polonica*, **79**, 37—51.
- FÖRSTER, R., GAŹDZICKI, A. and WRONA, R. 1985. First record of a homolodromiid crab from a Lower Miocene glacio-marine sequence of West Antarctica. — *N. Jb. Geol. Paläont. Mh.*, **6**, 340—348.
- GAŹDZICKI, A. 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.
- JESIONEK-SZYMAŃSKA, W. 1987. Echinoids from the Cape Melville Formation (Lower Miocene) of King George Island, West Antarctica. In: A. GAŹDZICKI (ed.), *Palaeont. Results Polish Antarctic Expeds. I.* — *Palaeont. Polonica*, **49**, 163—168.
- KARCZEWSKI, L. 1987. Gastropods from the Cape Melville Formation (Lower Miocene) of King George Island, West Antarctica. In: A. GAŹDZICKI (ed.), *Palaeont. Results Polish Antarctic Expeds. I.* — *Ibidem*, **49**, 127—146.
- RONIEWICZ, E. and MORYCOWA, E. 1985. Fossil *Flabellum* (Scleractinia) of Antarctica. — *Acta Palaeont. Polonica*, **30**, 99—106.
- and — 1987. Development and variability of Tertiary *Flabellum rariseptatum* (Scleractinia), King George Island, West Antarctica. In: A. GAŹDZICKI (ed.), *Palaeont. Results Polish Antarctic Expeds. I.* — *Palaeont. Polonica*, **49**, 83—104.
- SZANIAWSKI, H. and WRONA, R. 1987. Polychaete jaws from the Cape Melville Formation (Lower Miocene) of King George Island, West Antarctica. — *Ibidem*, **49**, 105—126.
- WELLS, J. W. 1967. Corals as bathometers. — *Marine Geol.*, **5**, 349—365.

EXPLANATIONS OF THE PLATES 36—43

All specimens are from the Cape Melville Formation (Lower Miocene), King George Island, West Antarctica

PLATE 36

Antarctidromia inflata FÖRSTER, 1985

- 1—2. Dorsal and ventral view of a larger individual with well preserved third maxillipeds; ZPAL Cr. I/1, natural size.
3. Lateral view of carapace; note prominent hepatic spine; ZPAL Cr. I/63, natural size (compare pl. 37, fig. 2 and pl. 41, fig. 5).

4. Dorsal view of carapace; hepatic and particularly branchial region crushed by compaction of the sediment; ZPAL Cr. I/3, $\times 1.5$.
5. Dorsal view of small individual; ZPAL Cr. I/5, natural size.

PLATE 37

Antarctidromia inflata FÖRSTER, 1985

1. Frontal view; downwards directed frontal spine (FS); preorbital spines (PrS) broken off. Right cheliped folded downwards; ZPAL Cr. I/139, $\times 2$ (compare fig. 5 below).
2. Frontal view showing frontal spine, preorbital spines and flattened subhepatic region below frontolateral margin and antennal (AS) respectively hepatic (HS) spines; ZPAL Cr. I/63, $\times 2$ (compare pl. 36, fig. 3; pl. 41, fig. 5).
3. Carapace of small individual with proximal parts of the last two pereopods; ZPAL Cr. I/5, natural size (compare pl. 36, fig. 5 before preparation).
4. Individual showing parts of the right pereopods: cheliped folded ventrally against buccal cavity; ZPAL Cr. I/17a, natural size.
5. Individual with downwards folded right cheliped (compare fig. 1 above); ZPAL Cr. I/139, natural size.
6. Disintegrated individual; ventral skeleton with attached proximal parts of pereopods and abdomen have been rotated 180° around the carapace, lying sideways above carapace; abdomen partly disintegrated and inflexed; ZPAL Cr. I/127, natural size.

PLATE 38

Antarctidromia inflata FÖRSTER, 1985

1. Dorsal view of large individual, showing second pereopod (ischium and merus) in a life-like position; note spinose lateral margin of left preorbital (PrS) spine; ZPAL Cr. I/7, natural size.
2. Largest carapace of *Antarctidromia*; ZPAL Cr. I/6, natural size.

PLATE 39

Antarctidromia inflata FÖRSTER, 1985

1. Lateral view of a small crushed specimen; ZPAL Cr. I/52, natural size.
2. Individual in life-like attitude; ventral skeleton slightly dislocated to the left side; the first two somites of the abdomen are visible; holotype ZPAL Cr. I/4, $\times 1.5$.
3. Dorsal view of heavily crushed carapace; ZPAL Cr. I/2, $\times 1.5$.
4. Individual in life-like attitude; fifth pereopods reduced in size and shifted in a subdorsal position; ridges of pereopods armed by strong spines; ZPAL Cr. I/44, natural size.

PLATE 40

Antarctidromia inflata FÖRSTER, 1985

1. Frontolateral view of frontal region, showing downwards directed frontal spine, antennoorbital cavity and proximal parts of right antennula (a_1); ZPAL Cr. I/233, $\times 4$.
2. Lateral view of carapace showing lateral margin which expires on posterior branchial region; ZPAL Cr. I/2 (see pl. 39, fig. 3), $\times 1,5$.
3. Ventral view of disintegrated individual, showing the life-like position of chelipeds; ZPAL Cr. I/85, natural size.

PLATE 41

Antarctidromia inflata FÖRSTER, 1985

1. Disintegrated ventral skeleton; note the narrow anteromedian projection (= fused thoracic sterna 1 to 3) and the posterolateral projections of sterna 3 to 5 (= episternum) which support the articulation of the third maxillipeds and the pereopods; ZPAL Cr. I/18, natural size.
2. Ventral view of individual showing the abdomen, proximal parts of pereopods 1 to 3 and remains of the third maxillipeds; ventral skeleton slightly shifted to the left side; ZPAL Cr. I/3, natural size (compare pl. 36, fig. 4).
3. Ventral view of holotype; note life-like position of pereopods; merus of the second pereopod lengthened in relation to the merus of the cheliped; ZPAL Cr. I/4, $\times 1,5$.
4. Abdomen and proximate parts of pereopods 1 to 3; ZPAL Cr. I/13, natural size.
5. Dorsal view of carapace showing well preserved frontal region; preorbital spine (PrS) with delicate lateral spines, prominent hepatic (HS) spine; ZPAL Cr. I/63 (compare pl. 36, fig. 3; pl. 37, fig. 2), natural size.
6. Abdomen and proximate parts of pereopods 1 to 4; note the well developed pleura, distinctly delimited from median arch of the tergum; ZPAL Cr. I/24, natural size.

PLATE 42

Antarctidromia inflata FÖRSTER, 1985

1. Cuticle; vertical break showing unlamellated layer (at the top, right) probably equivalent to the epicuticle, and the finely laminated calcified zone of the endocuticle, $\times 200$.
2. Enlargement of part of fig. 1; $\times 500$.
3. Enlargement of central part of fig. 2; $\times 1400$.
4. Small clusters of pyrite in vugs of the laminated layer; $\times 2000$.

All figures are SEM micrographs

PLATE 43

1. Horizontal burrow from the upper part of the Cape Melville Formation, exposed on the top of peninsula plateau in the Crab Creek area.
- 2—3. Transversal sections of the burrow; ZPAL Cr. I/281; natural size.
4. Transversal section of burrow enclosing crab carapace; pereopods arrowed; ZPAL Cr. I/282; natural size.
5. Burrow, showing lower surface; visible internal structure; ZPAL Cr. I/283; $\times 0,7$.
6. General view, of the top surface of a burrow; ZPAL Cr. I/284; $\times 0,5$.

