

# A new species of *Glyphea* (Decapoda: Palinura) from the La Meseta Formation (Eocene) of Seymour Island, Antarctica

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A new species of palinuran lobster, *Glyphea reticulata*, from the lowermost part of the Eocene La Meseta Formation on Seymour Island, Antarctica, represents one of the stratigraphically youngest species of *Glyphea*. The occurrence of the last vestiges of what was previously a cosmopolitan genus in a region dominated by Pacific Ocean faunal influences is significant because the sole extant species of the Glypheidae, *Neoglyphea inopinata* Forest & Saint Laurent, 1975, is known only from the west Pacific.

**Key words:** Decapoda, Glypheidae, paleobiogeography, evolution, Eocene, Antarctica.

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## Introduction

The La Meseta Formation (Elliot & Trautman 1982) is the Eocene to ?early Oligocene sequence of richly fossiliferous shallow marine deposits exposed in the northern portion of Seymour Island, Antarctic Peninsula (Fig. 1). It comprises an approximately 800 m thick succession of poorly consolidated sandstones and siltstones with very well preserved micro- and macrofossils (Stilwell & Zinsmeister 1992). Anomuran and brachyuran decapod crustaceans are found throughout most of the formation and document a remarkably diverse assemblage in such a high latitude setting (Feldmann & Wilson 1988). The purpose of this work is to describe the first macruran remains from the La Meseta Formation.

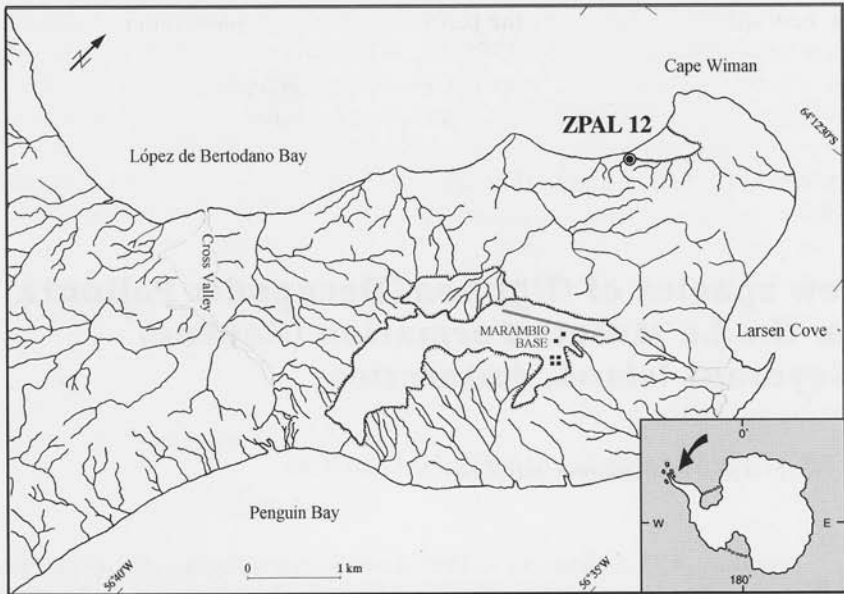


Fig. 1. Map of the northern part of Seymour Island showing the site from which *Glypheia reticulata* sp. n. was collected (ZPAL 12 Sadler Stacks). Arrow of inset shows the location of Seymour Island in Antarctica.

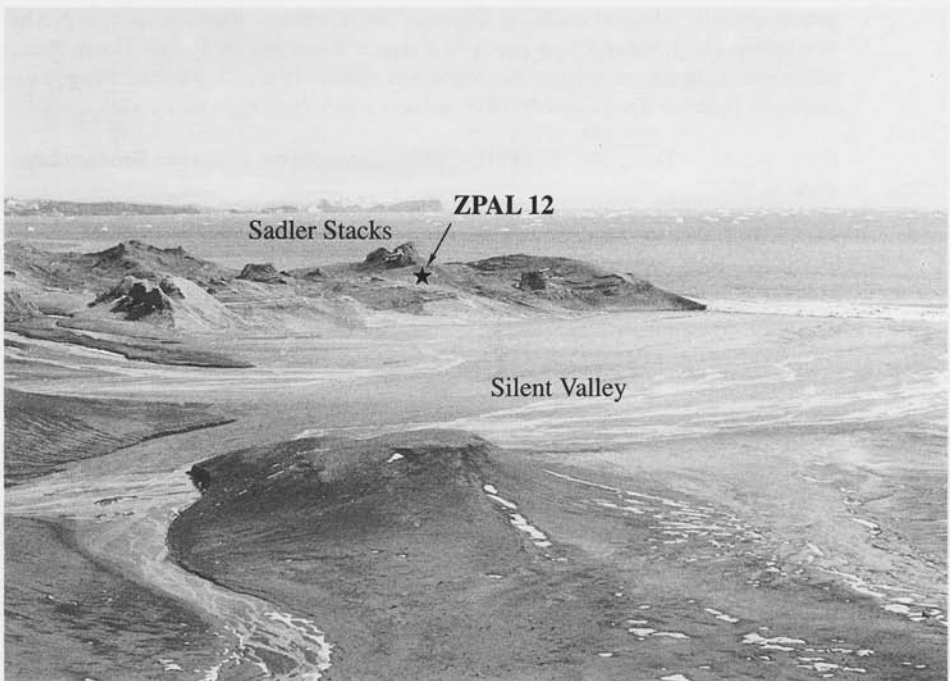


Fig. 2. View of Seymour Island, looking southward from Cape Wiman (Elliot Ridge). Asterisk denotes the collecting site (ZPAL 12, Sadler Stacks). Photo by A. Gaździcki, February 1994.

The new species of macruran, the palinuran lobster *Glyphea reticulata*, occurs in the lower units (Telm 1–2) (Sadler 1988) of the La Meseta Formation which crops out on the south side of the east-west trending Silent Valley (Gaździcki & Tatur 1994) near Cape Wiman (Fig. 1). The specimens were found in carbonate cemented concretions which occur in gray sandy siltstone and sandstone with intercalations of shelly hash at locality ZPAL 12, Sadler Stacks (Fig. 2). The lobsters are associated with abundant cyclostome and cheilostome bryozoans (Gaździcki & Hara 1994; Hara in press), numerous brachiopods (Bitner 1996), corals (Stolarski 1996), gastropods, bivalves including large *Ostrea* and *Pecten* shells, shark teeth, and shell fragments. Microfossils are represented by marine palynomorphs, benthic foraminifera, and ostracods. The age of the lower part of the La Meseta Formation (units Telm 1–2) has been determined to be early Eocene on the basis of dinoflagellate cysts (Cocozza & Clarke 1992).

The lobster collection, represented by two nearly complete carapaces and other fragmentary remains, is housed in the Institute of Paleobiology of the Polish Academy of Sciences, Warszawa, abbreviated ZPAL.

## Systematics

Order Decapoda Latreille, 1803

Infraorder Palinura Latreille, 1803

Superfamily Glypheoidea Winckler, 1883

Family Glypheidae Winckler, 1883

Genus *Glyphea* von Meyer, 1835

Type species: *Palinurus regleyanus* Desmarest, 1882 by original designation.

*Glyphea reticulata* sp. n.

Fig. 3A–C.

Holotype: Specimen ZPAL Cr. IV/1 (Fig. 3A).

Type horizon and locality: Telm 1–2, La Meseta Formation (Eocene), Sadler Stacks, Seymour Island, Antarctica.

**Etymology:** The trivial name alludes to the reticulate pattern of ornamentation developed on the thoracic portion of the cephalothorax which serves to distinguish this species from all others.

**Diagnosis.** — Differs from other species of *Glyphea* in having the combination of pustulose hepatic region, small spines along posterior edge of cervical groove, uniformly fine reticulate sculpture over thoracic portion of carapace, and transverse groove on abdominal terga developed only abaxially.

**Description.** — Cephalothorax moderate size for genus, height about 42% length excluding rostrum. Dorsal margin straight or slightly down-curved anteriorly; posterior margin straight to weakly concave dorsally and strongly convex ventrally; posteroventral margin smoothly convex, greatest height at about midlength; anteroventral margin straight, sloping posteroventrally, strongly downturned at base of cervical groove. Rostrum and front not preserved.

Cervical groove weakly concave forward, intercepts dorsum at 65° angle at distance of 36% total length of cephalothorax, curving anteriorly near base to join antennal

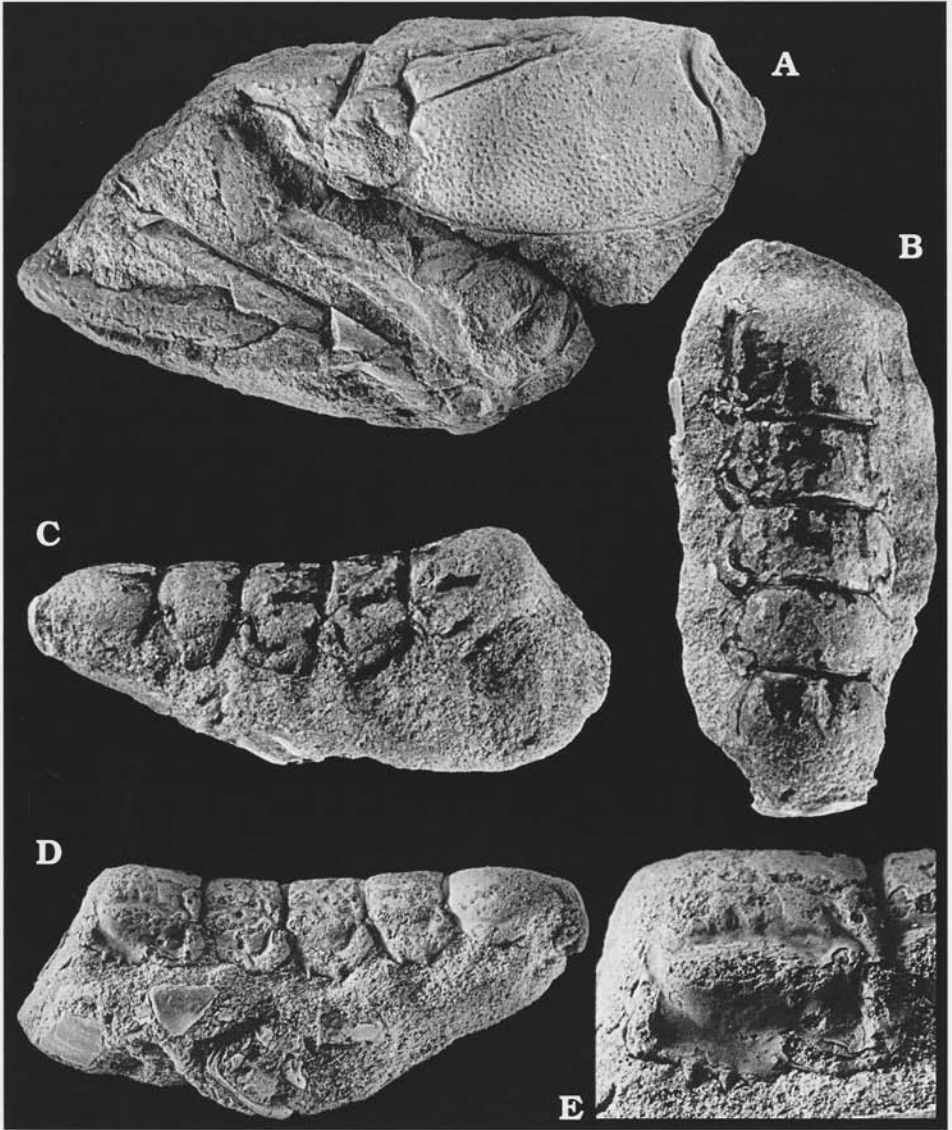


Fig. 3. *Glyphea reticulata* sp. n. **A.** Left lateral view of holotype, ZPAL Cr. IV/1, whitened, showing flattened, slightly distorted carapace, endophragmal skeleton below carapace, and portions of pereiopods,  $\times 1.5$ . **B.** Dorsal view, ZPAL Cr. IV/2, unwhitened, showing the nature of exfoliation of cuticle,  $\times 1.5$ . **C.** Right lateral view, ZPAL Cr. IV/2, unwhitened, showing abdominal somites 2-6,  $\times 1.5$ . **D.** Left lateral view, ZPAL Cr. IV/2, whitened, showing abdominal somites 2-6,  $\times 1.56$ . **E.** Enlargement of left lateral view of somite 2, ZPAL Cr. IV/2, whitened, showing details of pleural margin,  $\times 3$ .

groove. Branchiocardiac groove narrow, deeply incised, steeply oblique, approaching dorsum at  $21^\circ$  angle, curving abruptly to cross dorsum at  $63^\circ$  angle. Postcervical groove as strong as branchiocardiac, approaching dorsum at  $8^\circ$  angle, converging toward

branchiocardiac posteriorly to meet just above inflection in branchiocardiac groove. Inferior groove concave forward, distinct. Antennar groove extends parallel to ventral margin.

Cephalic region poorly preserved, with at least three longitudinal spinose ridges. Antennal ridge strongest. Hepatic region coarsely pustulose. Prominent, coarse nodes or spines in row posterior to cervical groove, remainder of carapace with finely reticulate, elevated sculpture. Marginal rim broad, smooth, distinct posteriorly, becoming narrower but remaining distinct ventrally.

Abdominal somites 2–6 preserved. Somites 2 and 6 about 1.4 times average length of somites 3–5. Generally smooth tergal surfaces and sculpted pleural surfaces bearing grooves and with spinose margins.

Somite 2 with smooth tergum about as long as wide, strongly arched transversely, bearing shallow groove extending from posterior articulation anterodorsally, becoming more obscure and disappearing about 4 mm from point of origin. Tergum separated from pleuron by broad, shallow, arcuate sulcus extending from just above anterior articulation to posterior articulation. Another broad, shallow sulcus more or less extends parallel to pleural margin dividing pleuron into smooth, elevated central region and flattened rim. Pleural margin straight anteriorly and apparently smoothly curved posteriorly, bearing ventrally-directed, fine spines at least on anterior portion.

Somites 3–5 similar in configuration, shorter than somite 2, somewhat more broadly arched transversely, appearing wider than long in dorsal aspect. Terga similar to that of somite 2 except anterodorsally directed groove obscure on somite 5. Pleura with broader borders, about 40 percent length of each pleuron. Pleural margins of three straight elements separated by small, but distinct, spines; one spine at midlength and one at anteroventral corner. Somite 6 with generally smooth tergum and very weak groove separating tergum from smooth pleura. Pleural margin of two straight elements of approximately equal length. Telson and uropods not preserved.

Endophragmal skeleton poorly preserved, represented by somites P<sub>1</sub>–P<sub>3</sub>.

Appendages represented by proximal elements of pereopods 3–5; elongate, slender. Height of meri about 0.17 length of element. Surfaces with longitudinal rows of punctae overall and single row of small spines ventrally. Terminations of appendages unknown.

**Dimensions.** — See Table 1.

Table 1. Measurements, in mm, taken on the holotype and two paratypes of *Glypheia reticulata* sp. n.

Specimen	Carapace						
	CL <sub>1</sub>	CL <sub>2</sub>	CH				
Holotype ZPAL Cr. IV/1	39.0	25.0	16.3				
Paratype ZPAL Cr. IV/3	c. 38	24.5	16.6				
	Abdomen						
	L <sub>2</sub>	H <sub>2</sub>	L <sub>3</sub>	H <sub>3</sub>	L <sub>4</sub>	L <sub>5</sub>	L <sub>6</sub>
Paratype ZPAL Cr. IV/2	10.3	6.7	7.9	7.1	6.9	7.6	10.3

CL<sub>1</sub> – Carapace length, excluding rostrum; CL<sub>2</sub> – Carapace length from posterior to cervical groove; CH – Maximum carapace height; L<sub>2</sub>, H<sub>2</sub>, etc. – Length and height measurements of the abdominal somites.

**Remarks.** — The specimens upon which this new species is based include two nearly complete carapaces, an abdomen lacking the first somite and the telson, a partial carapace, a partial abdomen, and a nearly complete specimen which is crushed and rather poorly preserved. Together, the specimens make it possible to describe all the elements necessary to place the material in the genus *Glyphea* with confidence. The only genera that might be confused with *Glyphea* are *Trachysoma* Bell and *Litogaster* von Meyer; however, in both these species the postcervical and branchiocardiac grooves are parallel one another. Quayle (1987) considered *Trachysoma* to be the junior synonym of *Glyphea*; however, that synonymy is not clear and it would be more prudent, at this point, to consider the two genera distinct. Glaessner (1969) recorded occurrences of the genus from New Zealand, Australia, and Germany, as well as England and, although none of these southern hemisphere occurrences is known to us, their existence must be documented before a definitive judgement can be made. Until that is done, the differences in the carapace groove pattern and the degree of development of the region of the mandibular articulation seem to serve as legitimate points of distinction.

A combination of characters exhibited by this species serves to distinguish it from all others. *Glyphea reticulata* possesses a well developed, entire postcervical groove, lacks an accessory groove, has a relatively coarsely ornamented hepatic region, and uniformly fine reticulate ornamentation over the posterior portion of the carapace. This array of characters, coupled with the generally unadorned tergal surfaces on which the transverse groove is only developed on the flanks, render it unique.

Examination of other species of *Glyphea*, including those from Great Britain monographed by H. Woods (1925–1931), Canada and the United States (Feldmann & McPherson 1980), and the Southern Hemisphere (Etheridge, Jr. 1917; J.T. Woods 1957; Taylor 1979; Feldmann 1993; Feldmann *et al.* 1993) confirm that the most distinctive feature of *Glyphea reticulata* is the presence of the reticulate ornamentation on the thoracic region of the carapace. Ornamentation on other species tends to range from nearly smooth to pustulose, to scabrous. Work in progress on undescribed species from New Zealand and Australia also supports the uniqueness of the reticulate ornamentation. Thus, there is little difficulty in distinguishing this new species from all others in the genus.

In terms of distribution of decapod crustaceans, glypheids are moderately well-represented in the Antarctic. *Glyphea alexandri* Taylor, 1979, and *G. georgiensis* Taylor, 1979, were described from Lower Cretaceous rocks of Alexander Island, in addition to *G. australensis* Feldmann *et al.*, 1993, from the Campanian–?Maastrichtian of James Ross and Vega islands.

Within the rest of the Southern Hemisphere, there may be as many as five other species. *Glyphea arborinsularis* Etheridge Jr., 1917 and *G. oculata* J.T. Woods, 1957 have been described from the Aptian and Albian, respectively, of Queensland, Australia (J.T. Woods 1957), *G. stilwelli* Feldmann, 1993 was described from Paleocene rocks of New Zealand (Feldmann 1993), and two other species, as yet undescribed, have been collected from the Cretaceous of Australia and the Eocene of New Zealand. Thus, the number of species from the Southern Hemisphere rivals that of the Northern Hemisphere.



The Glypheidae are represented by a single extant species, *Neoglyphea inopinata* Forest & Saint Laurent, 1975. This species, collected at depths of about 200 m on a substratum of fine sand, mud, and shell material (Forest, Saint Laurent & Chace, Jr. 1976), is known only from the South China Sea. Thus, the sole relict of a taxon that was much more widely distributed in the Mesozoic and early Cenozoic survives in the west-central Pacific. The depth at which *N. inopinata* lives is much greater than the probable depth at which *Glyphea reticulata* lived.

It is likely that all the specimens of *G. reticulata* represent molted remains. None of the specimens consists of complete, articulated skeletons and in two of the specimens in which the carapace is present, ZPAL Cr. IV/1 and ZPAL Cr. IV/4, there is a strong suggestion of molting. In both specimens, the endophragmal skeleton is displaced ventrally from the cephalothorax, which is typical of 'Salter's position'. Similar orientations of internal skeleton to carapace have been interpreted to be molts in other glypheids. *Glyphea robusta* Feldmann & McPherson, 1980, from the early Jurassic–early Cretaceous of Arctic Canada and *G. australensis* Feldmann *et al.*, 1993, from the Campanian–?Maastrichtian of James Ross and Vega islands, Antarctica, have been preserved in the same position. In the latter example, distortion of the carapace material further suggested that the carapace was soft and supple; additional evidence of molting. The carapace of the holotype of *G. reticulata* is flattened and somewhat distorted which reinforces the interpretation.

This new species occurs in association with another decapod, ?*Callianassa* sp. Recent detailed study of the Callianassidae and Ctenochelidae (Manning & Felder, 1991) has established several key characters of the chelipeds that are useful in generic placement; however, most of the diagnostic characters are to be found on the merus and carpus. These elements are not preserved on the specimens at hand and, therefore, generic placement must be considered tentative. Nonetheless, the specimens are important because most callianassids occur in inner sublittoral or littoral habitats which provides documentation for the bathymetric conditions at the depositional site of *Glyphea reticulata*.

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## **Nowy gatunek *Glyphea* (Decapoda: Palinura) z eoceńskiej formacji La Meseta Wyspy Seymour, Antarktyka**

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### **Streszczenie**

Z bogatych w skamieniałości utworów formacji La Meseta z Wyspy Seymour (Półwysep Antarktyczny) opisano nowy gatunek dziesięcionoga z rodzaju *Glyphea* (Decapoda: Palinura). Znalezione okazy reprezentują zapewne wylinki. Potwierdza to „pozycja Saltera”, wyrażająca się odspojeniem szkieletu endofragmalnego od głowotułowia, zaobserwowana w przypadku dwóch najbardziej kompletnych okazów. Nowy gatunek *Glyphea reticulata* jest jednym z najmłodszych wiekowo znanych przedstawicieli tego rodzaju.