

DISTRIBUTION OF CARNIVOROUS BENTHIC INVERTEBRATE IN THE NORTHEASTERN PART OF LÜTZOW-HOLM BAY, ANTARCTICA

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Abstract: Benthic invertebrates were collected by bait traps at 35 stations scattered in the northeastern part of Lützow-Holm Bay from May to September 1980. A total of 1103 carnivorous benthic invertebrates was obtained. They consisted of 41 species belonging to eight classes. *Ophionotus victoriae* was collected as many as 659 specimens occupying 59.7% of total invertebrates and *Neobuccinum eatoni* was the second in number. While, only one specimen was collected in 22 species out of 41 species. Species number tended to be larger in the shallow continental shelf than in the deep glacial trough. Species number was also large in the northern part of the study area compared with the southern part. The relation between the distribution of invertebrates and the bottom topography in a small area was studied in the Kita-no-ura Cove.

1. Introduction

The benthic invertebrates fauna around Syowa Station (69°00'S, 39°35'E) in the northeastern part of Lützow-Holm Bay, Antarctica was reported by HOSHIAI (1978, 1983), HOSHINO (1976) and YAMANAKA (1982). They used a bait trap for sampling. WATANABE *et al.* (1982) carried out the direct observation of the fauna by SCUBA diving.

During the 1980 winter, Y. NAITO, one of the authors collected carnivorous animals with a bait trap, from which NAITO and IWAMI (1982) described the vertical distribution and the stomach contents of fishes, in the northeastern part of Lützow-Holm Bay. The present authors examined the invertebrates, the rest of the samples. Although the identification of specimens is still in process, they report preliminarily the results on the distribution of the invertebrates.

2. Sampling Method

Bait trap sampling of animals under the sea-ice was performed at 35 stations in the northeastern part of Lützow-Holm Bay from May to September 1980 (Fig. 1). A sampling at each station comprised four times of trapping repeated at 1-6 days

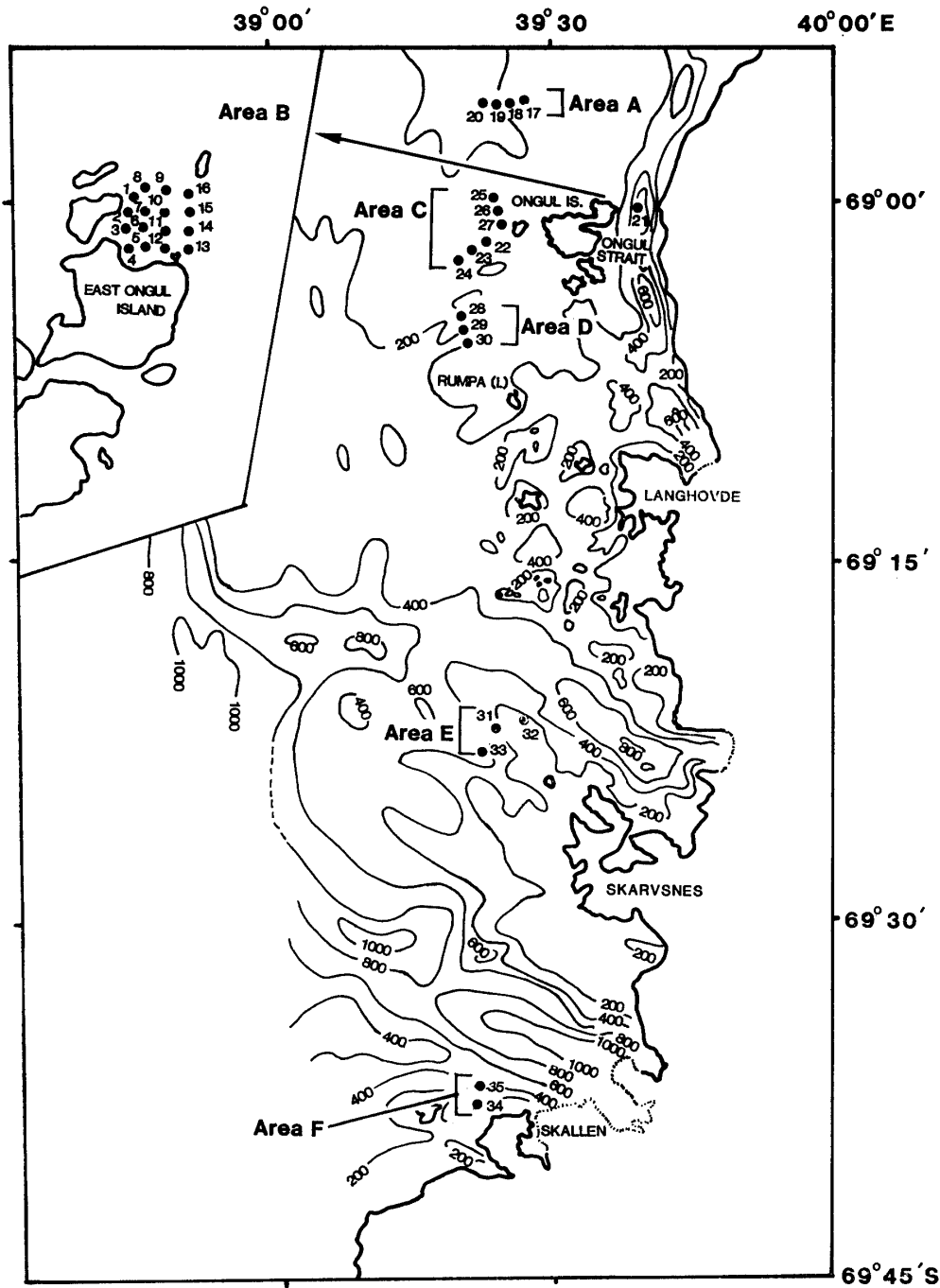


Fig. 1. Sampling stations in the northeastern part of Lützow-Holm Bay. Stations were conveniently grouped into A to F.

intervals. The trap used was a net trap for the mid-water shrimp fishing in Japan. The study area covered 75 km from north to south and 15 km from east to west. The depth of sea bottom ranged from 17 to 840 m. Details in actual trapping works were given in NAITO and IWAMI (1982).

3. Submarine Topography of Study Area

The bottom topography of the northeastern part of Lützow-Holm Bay was well studied by the geomorphologists of the Japanese Antarctic Research Expedition (FUJIWARA, 1971; MORIWAKI, 1975, 1979). Stations 1–16 were selected in a shallow bay named Kita-no-ura Cove, where the water depth is mostly less than 50 m (FUJIWARA, 1971). Stations of 17–30 except for Stn. 21 were occupied on the continental shelf less than 200 m in depth. Station 21 was settled in a glacial trough of 680 m in depth in the Ongul Strait. These stations were located in the northern part of the study area. Stations 31–35 except for Stn. 32 were set in troughs and steep slopes between ridge and trough. Station 32 was 83 m in depth on a small ridge. These five stations were situated in the southern part of the study area. For convenience, sampling stations were grouped as follows; Area A (Stns. 17–20), Area B (Stns. 1–16), Area C (Stns. 21–27), Area D (Stns. 28–30), Area E (Stns. 31–33) and Area F (Stns. 34, 35).

4. Occurrence and Abundance of Invertebrates

A total of 1103 carnivorous benthic invertebrates was collected by traps. They consisted eight classes; Anthozoa, Gastropoda, Crustacea, Crinoidea, Ophiuroidea,

Table 1. Number of specimens of carnivorous benthic invertebrate and its percentage to the total specimens collected in the northeastern part of Lützow-Holm Bay.

Class	Species	n.s.	%	Class	Species	n.s.	%
Anthozoa	Actiniaria sp.	8	0.7	Ophiuroidea	Ophiuroidea sp.	8	0.5
Gastropoda	<i>Neobuccinum eatoni</i>	193	18.0			9	1.1
	<i>Harpovoluta charcoti</i>	9	0.8			10	0.1
	<i>Chlanidota elongata</i>	5	0.5			11	0.1
	<i>Probuccinum tenuistriatum</i>	1	0.1	Asteroidea	<i>Diplasterias brucei</i>	31	2.8
	<i>Marseniopsis</i> sp.	1	0.1		<i>Odontaster validus</i>	21	1.9
Crustacea	<i>Glyptonotus antarcticus</i>	2	0.2		<i>Porania antarctica</i>	32	2.9
	Isopoda sp. 1	9	0.8		<i>Perknaster densus</i>	1	0.1
	2	1	0.1		Asteroidea sp. 1	1	0.1
	3	1	0.1		2	1	0.1
	<i>Lebbeus antarctica</i>	1	0.1		3	1	0.1
Crinoidea	Comatulida sp.	11	1.0		4	1	0.1
Ophiuroidea	<i>Ophionotus victoriae</i>	659	59.7		5	1	0.1
	<i>Astrotoma</i> sp.	1	0.1		6	1	0.1
	Ophiuroidea sp. 1	59	5.3		7	1	0.1
	2	1	0.1		8	1	0.1
	3	2	0.2	Echinoidea	<i>Sterechinus neumayeri</i>	5	0.5
	4	1	0.1		Echinoidea sp.	2	0.2
	5	1	0.1	Holothuroidea	Holothuroidea sp.	13	1.2
6	2	0.2					
7	1	0.1		Total	1103	100.0	

Asteroidea, Echinoidea and Holothuroidea. Twelve species were identified and the identification of other 29 species is in process. The individual number and percentage of each species are summarized in Table 1. Ophiuroidea appeared most numerous as many as 747 specimens occupying 67.7% of total invertebrates. Gastropoda was the second in number (209 specimens; 19.5%), and the other six classes were small in number.

On the basis of species, *Ophionotus victoriae* appeared most abundantly (659 specimens occupying 59.7% of the total specimens). Among them, a total of 400 specimens was collected at Stn. 20 in mid-July. Secondly, *Neobuccinum eatoni* was collected as many as 193 specimens occupying 18.0%. Ophiuroidea sp. 1 occurred thirdly (59 specimens; 5.3%). Then, *Porania antarctica* (32 specimens; 2.9%), *Diplasterias brucei* (31 specimens; 2.8%) and *Odontaster validus* (21 specimens; 1.9%) followed. These six species occupied 90.6% of the total specimens. While, only one specimen was collected in 22 species out of 41 species.

Glyptonotus antarcticus and *Lebbeus antarctica* were firstly discovered in the Syowa Station area. Two individuals of *G. antarcticus* were found at Stns. 14 and 15, where the water depth was 33.0 and 18.0 m, respectively. One *L. antarctica* was obtained at Stn. 31 of 450 m in depth.

The species number collected in an area was variable, namely, 18 species were caught in Area A, 20 in Area B, 14 in Area C, 3 in Area D, 8 in Area E and 4 in Area F. Areas A to D are located in the north and shallow part of the study area and Areas E and F are in the south and deep part. Therefore, in general, it seems that the species number in the north and shallow areas is larger than that in the south and deep areas. However, it is not clear why the species number in Area D was so low.

5. Vertical Distribution and Horizontal Extent of Invertebrate Species

Vertical distribution of the 15 species represented by more than 5 specimens is shown in Fig. 2. They had various distribution ranges. However, three groups were distinguished; 1) *N. eatoni*, Isopoda sp. 1, *O. victoriae*, *P. antarctica*, *D. brucei* and Ophiuroidea sp. 9 were distributed in a wide vertical range, 2) Actiniaria sp., *Harpovoluta charcoti*, *Chlanidota elongata*, Comatulida sp., Ophiuroidea sp. 1, Holothuroidea sp. and Ophiuroidea sp. 8 were distributed in waters shallower than 200 m, 3) *O. validus* and *Sterechinus neumayeri* were collected from very shallow waters. HOSHIAI (1978) reported that the distribution ranges of *O. validus* and *S. neumayeri* were restricted to the shallow sea.

As to their horizontal distribution the 15 species were classified into three groups (Fig. 3). They were 1) the wide extent group including *P. antarctica*, Isopoda sp. 1, *O. victoriae*, *D. brucei*, Holothuroidea sp. and Ophiuroidea sp. 9, 2) the relatively narrow extent group comprising *N. eatoni*, *H. charcoti*, Actiniaria sp., Ophiuroidea sp. 8, *C. elongata* and Comatulida sp., 3) the narrow extent group consisting of *S. neumayeri*, *O. validus* and Ophiuroidea sp. 1.

As mentioned above, in general, the horizontal extent of the species which had narrow vertical distribution range was limited in the northern part of the study area and the species which had wide vertical distribution range extended broadly from north

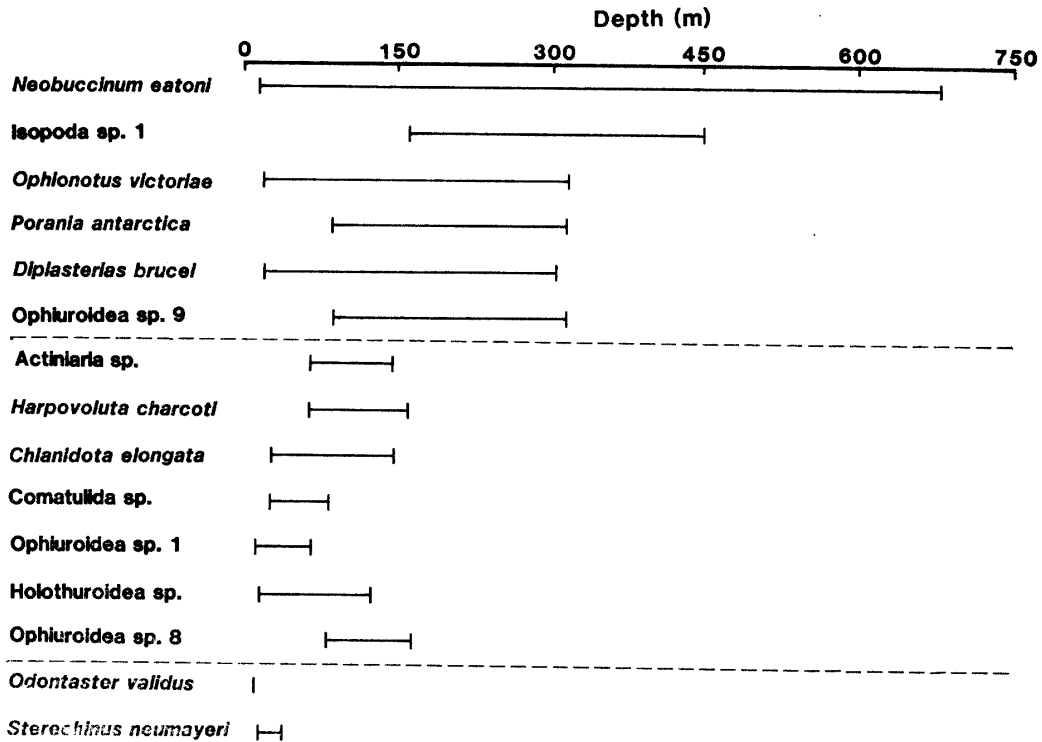


Fig. 2. Vertical distribution of 15 species represented by more than 5 specimens. Distribution ranges are shown by bars.

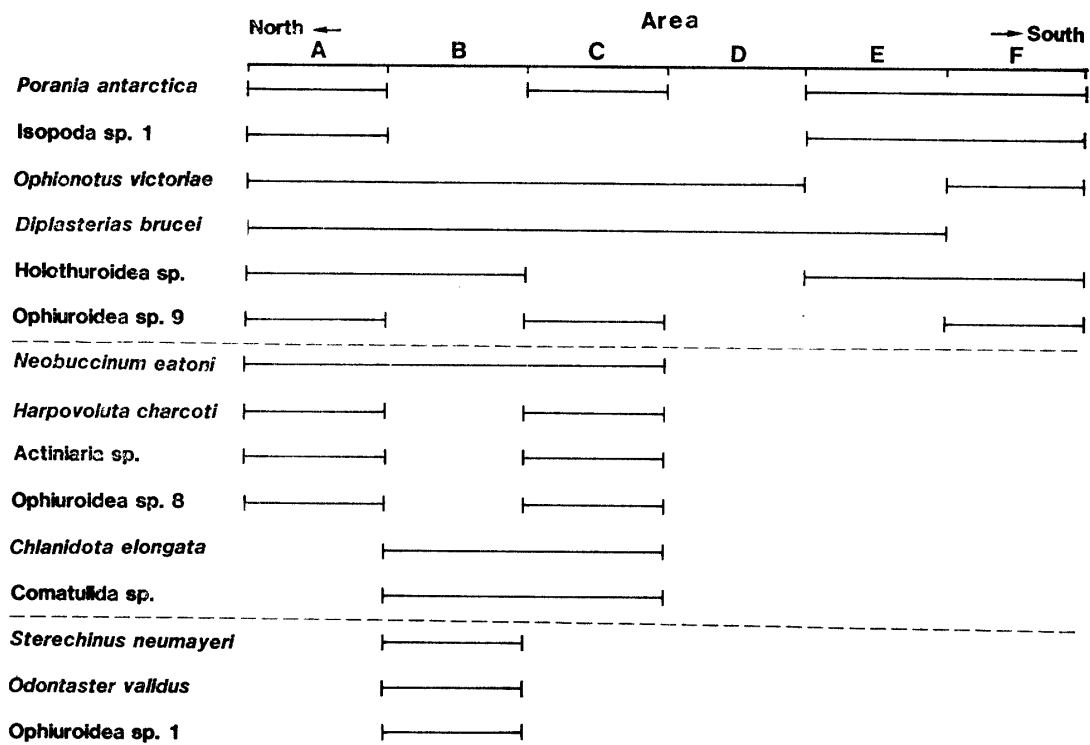


Fig. 3. Horizontal extent of 15 species represented by more than 5 specimens. Ranges of horizontal extent are shown by bars.

to south. However, *N. eatoni* showed a characteristic distribution pattern. It had a wide vertical distribution range of 17 to 680 m in depth but its horizontal distribution area was restricted to the northern part, though the depth of stations occupied in the southern part seemed suitable for the living of *N. eatoni*. *N. eatoni* was collected from various substrata including sand with pebble, rock with pebble, sandy mud and mud

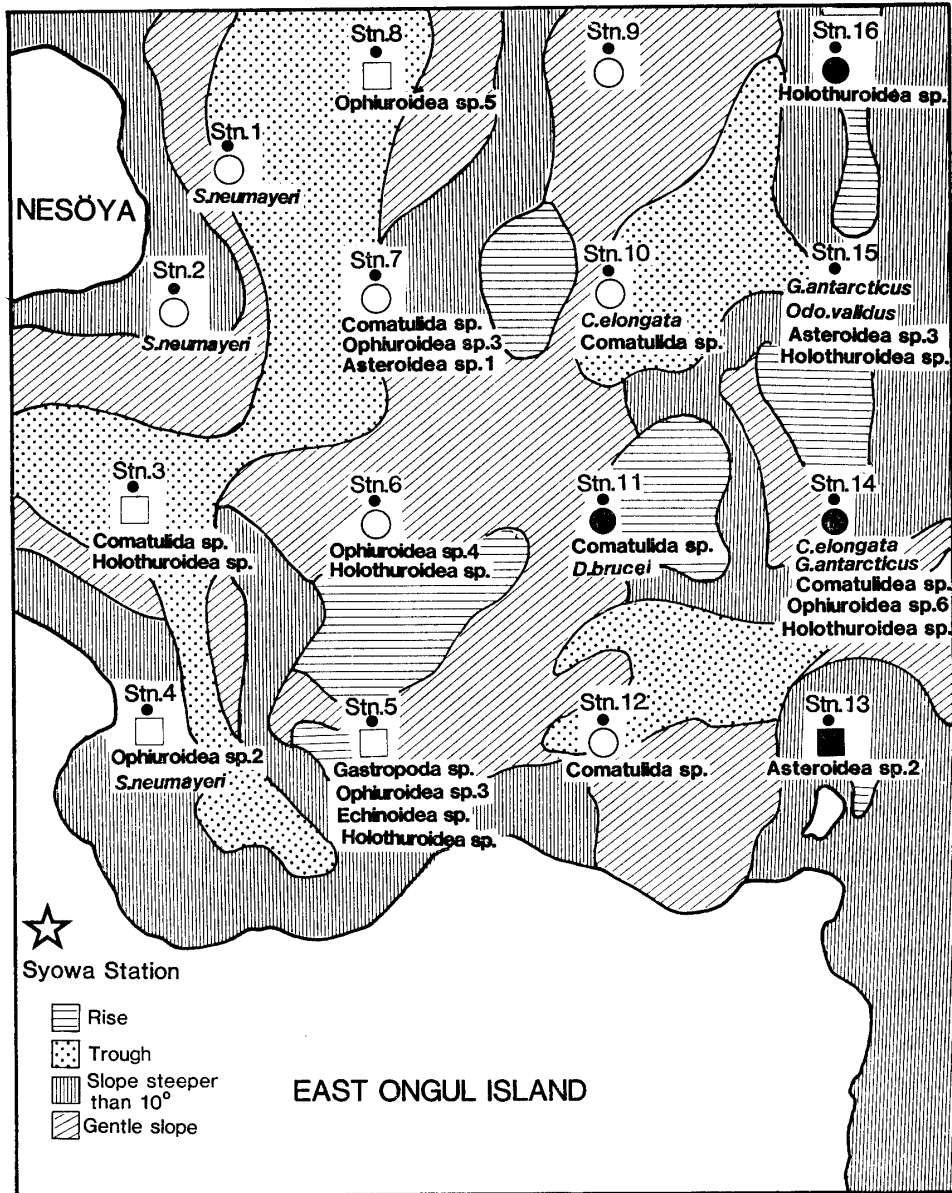


Fig. 4. Occurrence of species and bottom characteristics in the Kita-no-ura Cove. Symbols indicate species groups:

- represents *N. eatoni*, *O. victoriae*, *Ophiuroidea sp. 1* and *D. brucei*.
- represents *N. eatoni*, *O. victoriae* and *Ophiuroidea sp. 1*.
- represents *N. eatoni* and *O. victoriae*.
- represents *N. eatoni* and *Ophiuroidea sp. 1*.

Species collected other than those indicated by symbols are noted at each station.

(Modified from FUJIWARA, 1971)

in the waters around Syowa Station (HOSHIAI, 1978). Therefore, not only water depth and substrata but also other factors are likely to influence the occurrence of *N. eatoni*.

6. Occurrence of Invertebrates in Kita-no-ura Cove

The relation of the occurrence of invertebrates to the bottom topography was investigated in the Kita-no-ura Cove. The distribution of benthic invertebrates is illustrated in Fig. 4 with the bottom characteristics as defined by FUJIWARA (1971). *N. eatoni*, *O. victoriae* and Ophiuroidea sp. 1 were collected at most stations. But at stations in the easternmost part of the cove adjoining the Ongul Strait, the species occurred were different from those at the other stations. For example, Ophiuroidea sp. 1 was not collected at Stns. 11, 14, 15 and 16. *O. victoriae* was not caught at Stns. 13 and 15. *N. eatoni* was not obtained at Stn. 15. On the contrary, *G. antarcticus* and *O. validus* were collected at Stns. 14 and 15, though they did not appear at other stations. However, it is necessary to get more information in order to understand the relation between the distribution of the invertebrates and the bottom characteristics.

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