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Reports on the Biology of the "Umitaka-Maru" Expedition, Part 3

Thecosomatous Pteropoda Collected by the Training Vessel "Umitaka-Maru" from the Antarctic Waters in 1957

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INTRODUCTION

Considerable works on the antarctic Pteropodan fauna have been published until to-day. The important contributions among them are those by MEISENHEIMER (1906) on the samples of the "Deutsche Südpolar-Expedition", by ELIOT (1907) of the "National Antarctic Expedition" and by MASSY (1920, 1932) of the "Terra Nova" and "Discovery" Expeditions. Materials of the "Challenger" Expedition reported by PELSENEER (1888), those of the "Valdivia" Expedition by MEISENHEIMER (1905) and the "Dana" Expedition by TESCH (1946, 1948) include some specimens found in the sub-antarctic and arctic areas.

The Training Vessel "Umitaka-Maru" of the Tokyo University of Fisheries made some plankton-net tows in the Antarctic waters during her cruise in the service of escortship of the R. V. "Soya" for the Japanese Antarctic Expedition in 1956. By the courtesy of Professor Jiro SENO of the University, gastropods were sorted out from the plankton samples then collected and thereafter placed under our disposal. The present material mainly consists of thecosomatous pteropods. Their shells are mostly worn out by the action of formalin.

We wish to express our sincere gratitude to Prof. J. SENO of the Tokyo University of Fisheries, who managed in field collection of the present samples and arranged them for us to study.

COLLECTING METHOD AND LOCALITIES OF THE MATERIAL

The present materials were collected by two different types of plankton-net. One is tentatively called P-net with 45cm-diameter-mouth (*Marutoku*-net of NAKAI, 1962) and this was vertically hauled from a depth of 150 m up to the surface or the depth of 50 m. The another is tentatively called L-net with 130 cm-diameter-mouth (*Maruchi*-net of NAKAI, 1962) and this was horizontally towed through the sea surface.

The positions, date, time and other information relevant to the present collec-

tion are given in Table 1.

Table 1. Data Relevant to the Present Material: Only positive stations and positive hauls are given.

Station Number	Date (1957)	Time	S. Latitude	E. Longitude	P-net	L-net
8	I- 9	2320	66°17.3	44°02	—	*
9	I-10	2207	66°30	40°45	—	*
11	I-11	2200	67°09.7	36°14	—	*
12	I-12	1045	67°47.3	34°38.2	*	—
14	I-14	1041	67°54	28°20.5	—	*
15	I-14	2320	68°39	27°04	—	*
16	I-15	1040	68°52	25°09	—	*
18	I-16	2100	67°42	31°21	—	*
19	I-17	2120	67°44	33°34	*	—
21	I-19	2130	68°20	26°17	*	*
22	I-20	2130	68°31.5	25°21	—	*
26	I-26	0925	66°29.8	30°50	*	—
27	I-26	2230	66°55	27°49	—	*
28	I-27	0930	65°54.5	30°18	*	—
29	I-27	1920	66°44	29°12	—	*
31	I-29	0245	68°01.6	25°13.5	*	—
33	I-29	1750	68°47.5	24°08.5	—	*
34	II- 1	1020	67°20	27°00	—	*
35	II- 4	0050	67°34	35°51	—	*
37	II- 5	2210	67°12	39°20	—	*
40	II- 7	2330	67°50.2	31°21	—	*
42	II- 8	2132	68°00	26°08	—	*
44	II-19	1320	68°12	38°25.5	*	—
46	III- 1	2230	64°47	31°44	—	*
47	III- 2	0930	63°01	30°20	*	—
48	III- 2	2152	61°20.5	28°35	—	*
50	III- 3	2140	57°15.5	25°55	*	*
52	III- 6	0815	47°59.7	23°13.5	*	—
53	III- 6	2152	45°50	22°38	*	*
54	III- 7	0917	43°33.7	21°52	*	—

These positive stations are plotted in text-figure 1.

SYNOPSIS OF THE SPECIES OCCURRED

PTEROPODA THECOSOMATA

(1) *Limacina inflata* (d'ORBIGNY, 1836)

Limacina inflata, BOAS 1886, p. 48, Tab. 3, Fig. 38; PELSENEER 1888, p. 17; TESCH 1904, p. 11; MEISENHEIMER 1905, p. 4; TESCH 1913, p. 18, Fig. 8; BONNEVIE 1913, p. 23; VAYSSIÈRE

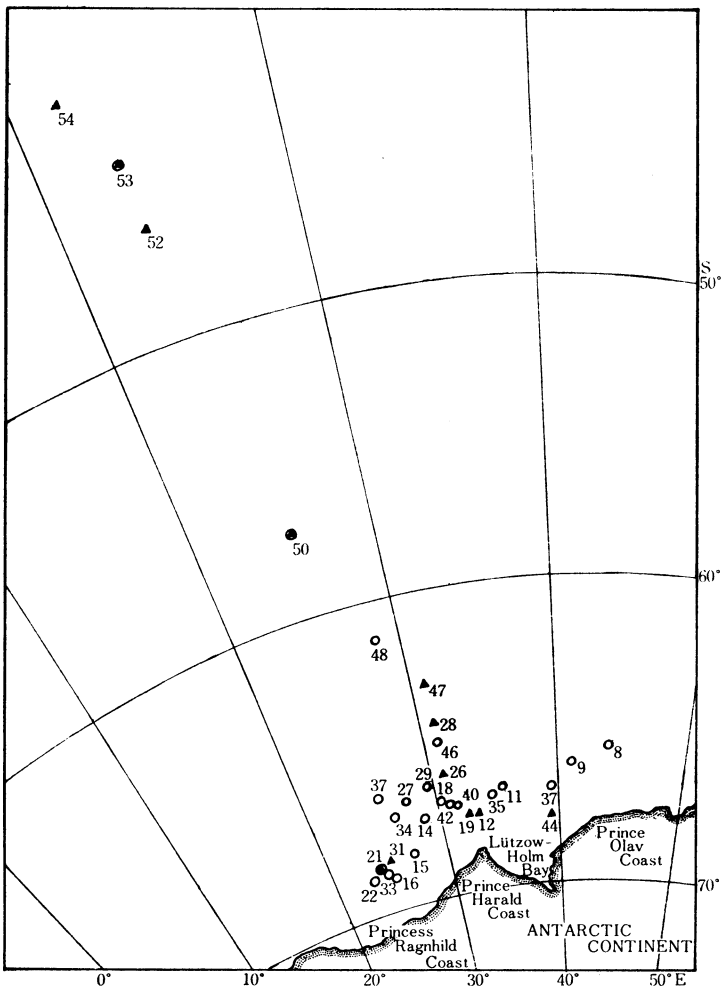
1915, p. 133, pl. 8, figs. 153–155, 167–169; TESCH 1946, p. 8; pl. 1, fig. 1; MORTON 1954, p. 170; TOKIOKA 1955, p. 61, pl. 7, figs. 5, 6; TAKI & OKUTANI 1962, p. 85, pl. 1, fig. 9.
Limacina (*Embolus*) *inflatus* DALL 1903, p. 80–81.

Occurrence: 4 individuals from St. 50 (P-net).

(2) *Limacina bulimoides* (d'ORBIGNY, 1836)

Spirialis bulimoides, SOULEYET 1852, p. 224, pl. 13, figs. 35–42.
Limacina bulimoides, BOAS 1886, p. 47, Tab. 3, Fig. 36, 37; PELSENEER 1888, p. 30; TESCH 1904, p. 13; MEISENHEIMER 1905, p. 11; TESCH 1913, p. 21, Fig. 14; VAYSSIÈRE 1915, p. 141, pl. 8, fig. 165; MASSY 1932, p. 285; TESCH 1946, p. 9, pl. 1, fig. 4; MORTON 1954, p. 171, fig. 2; TOKIOKA 1955, p. 26, pl. 8, fig. 9, 10; TAKI & OKUTANI 1962, p. 85, pl. 1, fig. 11.
Limacina (*Heterofusus*) *bulimoides*, DALL 1903, p. 80–81.

Occurrences: 423 individuals from Sts. 50, 52 and 54 (P-net).



Text-fig. 1. Location of positive stations for P-net (triangle) and L-net (circle).

Remarks: This species is characterized by its high spires, brownish suture and columellar lip. The species seems to form patches in the area under survey. MORTON (1954) studied reproduction system and sexual succession as well as vertical distribution of this Limacinid pteropod in the Benguela Current taken by the R.R.S. William SCORESBY.

(3) *Limacina lesueuri* (d'ORBIGNY, 1836)

Limacina lesueuri, BOAS 1886, p. 46, Tab. 3, fig. 33, 34; MEISENHEIMER 1905, p. 9; TESCH 1913, p. 18, Fig. 9; 1946, p. 8, pl. 1, fig. 2; VAYSSIÈRE 1915, p. 146, pl. 8, figs. 161–164; pl. 11, figs. 254–259.
Limacina (Heterofusus) Lesueuri, DALL 1903, p. 80–81.

Occurrence: 1 individual from St. 52 (P-net).
Remarks: As a specimen examined has no shell, the determination is doubtful.

(4) *Limacina helicina rangi* (d'ORBIGNY, 1836)

Limacina rangii, TESCH 1913, p. 19, Fig. 10.
Limacina helicina rangi, TESCH 1948, p. 8, fig. 4A–D.

Occurrence: 5 individuals from 4 stations (P-net) and 81 individuals from 6 stations (L-net).

Remarks: All of the specimens treated here have no shells. The soft part of them are mutilated. The specimen in rather good condition shows strong similarity to the well-known boreal *Limacina helicina helicina* (PHIPPS). From view point of positions of capture, they were identified as an anti-boreal congener, *helicina rangi*.

(5) *Limacina* species indet.

Occurrence: More than 3006 individuals from 8 stations (P-net) and 5 individuals from 5 stations (L-net).
Remarks: The specimens examined are mostly immature individuals.

(6) *Cavolinia inflexa labiata* (d'ORBIGNY, 1836)

Hyalaea depressa, PELSENEER 1888, p. 90; TESCH 1904, p. 47, pl. 2, fig. 74–77.
Hyalaea labiata, SOULEYET 1852, p. 159, pl. 5, fig. 27–32.
Hyalaea inflexa, BOAS 1886, p. 123, Taf. 1, Fig. 11, Taf. 2, Fig. 21, Taf. 6, Fig. 98.
Cavolinia inflexa, PELSENEER 1888, p. 85; TESCH 1904, p. 43, pl. 2; fig. 54–63; MEISENHEIMER 1905, p. 35; MASSY 1932, p. 274; BONNEVIE 1913, p. 34: TESCH 1913, p. 52; MORTON 1954, p. 176.
Cavolinia (Cavolinia) inflexa, DALL 1903, p. 82–83.
Cavolinia inflexa lata, TESCH 1946, p. 30, pl. 3, fig. 21a; 1948, p. 31, fig. 29.
Cavolinia inflexa labiata, TOKIOKA 1955, p. 68, pl. 11, fig. 29–33; TAKI & OKUTANI 1962, p. 89, pl. 1, fig. 8.

Occurrence: 2 immature specimens from St. 50 (P-net).

(7) *Euclio pyramidata* (LINNÉ, 1767)

Cleodora lanceolata, SOULEYET 1852, p. 179, pl. 6, fig. 17–52.

Cleodora pyramidata, BOAS 1886, p. 69, Tab. 5, Fig. 74, Fig. 84–86; Tab. 6, Fig. 96–97; Tab. 4, Fig. 47; FRIELE & GRIEG 1901, p. 122; MASSY 1932, p. 277.
Clio pyramidata, PELSENEER 1888, p. 36; LENZ-LÜBECK 1906, p. 3, fig. 1–4; MEISENHEIMER 1905, p. 21, Taf. 1, Fig. 11, 17, 18; Taf. 2, Fig. 8, 14, 15; Taf. 3, Fig. 1, 14, 21; Taf. 4, Fig. 5, 7, 13, 14; Taf. 5, Fig. 1, 5, 7, 16, 18; Taf. 6, Fig. 5, 12; Taf. 7, Fig. 4, 16, 18, 19; TESCH 1913, p. 35.
Cleodora (Cleodora) pyramidata, DALL 1903, p. 80–81.
Clio (s. str.) *pyramidata*, TESCH 1904, p. 29, pl. 2, figs. 22, 23.
Clio (Euclio) pyramidata, BONNEVIE, 1914, p. 28, pl. 3, fig. 22, 23, 27.
Euclio pyramidata, TESCH 1946, p. 14, pl. 2, fig. 11; 1948, p. 12; MORTON 1954. p. 176; MENZIES 1958, p. 383, fig. 1A–C.

Occurrence: 1 specimen from St. 50 (P-net). A part of undetermined *Euclio* captured by L-net may be this species. But it is uncertain because they are mutilated.

(8) *Euclio sulcata* (PFEFFER, 1879)

Clio sulcata, ELIOT 1907, p. 9; MEISENHEIMER 1905, p. 24, Taf. 3, Fig. 11; Taf. 5, Fig. 11; TESCH 1913, p. 35, Fig. 30.
Cleodora sulcata, MASSY 1932, p. 276.

Occurrence: More than 48 individuals were collected by L-net from Sts. 46, 48, 50 and 53.
Remarks: Almost all of the present material was badly mutilated. The shelly matter was mostly dissolved by the preservative. The specimens in rather good condition are illustrated in plate 1.

The shell as a whole is lanceolate and more elongated than *E. chaptalii* or *E. balantium*. The external surface is ornamented by fine and regularly spaced incremental lines. The dorsal side presents 9–10 longitudinal ridges which are not straight and fainter towards the right side. The ventral side is slightly swollen and has a single depressed ridge. Therefore, a sagittal section of the shell presents a lens-shape outline. The posterior part of the shell is gradually tapered and not curved dorsally. Protoconch is drop-shaped with a pointed end (*pyramidata*-type). Total length of the largest specimen measures 17 mm in length (evidently the specimen was larger than this in complete state).

A spectacular characteristic of the soft part is an arrangement of crateriform cells of the pallial gland. The major part of the shield-like pallial gland is occupied by a broad belt of crateriform cells. From this broad belt, a narrow belt is branched off anteriorly. A crescent island of another type of glandular cells (*jigsaw-puzzle cell* of TESCH) is enclosed within by these two belts. Such a structure of pallial gland is common to *E. pyramidata* and *E. antarctica*.

This species has been known as a characteristic thecosome of ice-bond regions in the southern hemisphere (TESCH 1948, p. 20). The known records of capture of this species are as follows:

PFEFFER, 1879 (*fide* PELSENEER, 1888): 50°34′S, 83°48′W; 45°35′S, 122°1′W.
PELSENEER, 1888: 52°4′S, 71°22′E; 63°30′S, 89°8′E; 62°26′S, 95°44′E.
MEISENHEIMER, 1906: Antarctic to about 50°S in the Indian Ocean and 46°S

in the Pacific.

MEISENHEIMER, 1905: *Valdivia* St. 132 (55°21′S, 5°16′E); St. 135 (56°30′S, 14°-29′E); St. 136 (55°57′S, 16°15′E); St. 139 (55°1′S, 21°34′E); St. 142 (55°27′S, 28°59′E); St. 145 (59°16′S, 40°14′E); St. 149 (62°-27′S, 53°22′E). Depth 1,000, 1,500 or 2,000 to the surface. Temperature for capture ranged −0.4°C to −1.4°C.

MASSY, 1920: 5° South of New Zealand to far within the Antarctic Circle.

MASSY, 1932: From 34 stations at the South Sandwich Islands; few stations at South Georgia and between Falkland and South Georgia. More than 2,000 specimens collected by the *Discovery* were 2–30 mm in average.

SPECIES COMPOSITION AND DISTRIBUTION

On the basis of results of identification, the occurrences of species by station are shown in Table 2 for P-net (vertical haul) and Table 3 for L-net (horizontal tow). The entire catch comprised of 7 identified and few unidentified pteropods.

None of *Euclio sulcata* was collected by vertical hauls of small P-net. However, P-net collection contained more species (7 spp.) than that of L-net (4 spp.).

The distributional area of *Limacina helicina rangi* which is a characteristic pteropod in the Antarctic waters is apparently restricted to the south of 55°S. On the contrary, *L. inflata* and *L. lesueuri* that are distributed in the temperate zone were found from the stations located north of 55°S. A great number of Limacinid juvenile specimens was not identified.

Table 2a. Occurrence of Pteropoda by station (P-net: 0-150m+50-150m)

Sp. / St.	*Limacina inflata*	*L. bulimoides*	*L. helicina rangi*	*L. lesueuri*?	*L.* spp. indet.	*Cavolinia inflexa*	*Euclio pyramidata*	Total
12	—	—	1	—	—	—	—	1
19	—	—	—	—	1	—	—	1
21	—	—	—	—	1?	—	—	1
26	—	—	1	—	—	—	—	1
28	—	—	—	—	1	—	—	1
31	—	—	1?	—	—	—	—	1
44	—	—	—	—	1	—	—	1
47	—	—	—	—	1	—	—	1
50	4	194	2	—	—	2	1	203
52	—	25	—	1	1000<	—	—	1026<
53	—	—	—	—	1	—	—	1
54	—	204	—	—	2000<	—	—	2204<
No. ind.	4	423	5	1	3006<	2	1	3442<
No. st.	1	3	4	1	8	1	1	13

Table 2b. Occurrence of Pteropoda by station (L-net: 0 m)

St. \ Sp.	*Limacina helicina rangi*	*Limacina* sp. indet.	*Euclio sulcata*	*Euclio* sp. indet.	Total
8	—	—	—	2	2
9	3	—	—	3	6
11	—	—	—	2	2
14	—	—	—	2	2
15	17	—	—	—	17
16	8	—	—	—	8
18	5	—	—	—	5
21	31	—	—	—	31
22	15	—	—	—	15
27	—	1	—	—	1
29	—	1	—	—	1
33	—	1	—	—	1
34	2	1	—	—	3
35	—	—	—	3	3
37	—	—	—	3	3
40	—	—	—	2	2
42	—	1	—	—	1
46	—	—	11	—	11
48	—	—	15<	—	15<
50	—	—	20<	—	20<
53	—	—	2	1	3
No. ind.	81	5	48<	18	152<
No. st.	6	5	4	8	21

In regard to P-net collection, the dominant species is *Limacina bulimoides* which was also abundantly captured by the R. V. *William Scoresby* (MORTON, 1954). The dominant species in the L-net catch was *Limacina helicina rangi* followed by *Euclio sulcata*.

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海鷹丸探検生物学報告 第3報

練習船海鷹丸が昭和32年南極探検航海中に南極海域で採集した有殻翼足類

滝　　巌・奥谷喬司

昭和32年海鷹丸が南極探検航海中南極海域で実施したプランクトンネット採集によって採られた有殻翼足類を同定した．口径 45cm のネット（㊨ネット）の垂直曳採集物については12地点分から7種，口径 130cm のネット（㋒ネット）の水平曳採集物については21地点から4種同定された．

垂直曳きの方の優占種は *Limacina bulimoides* タワラナリウキマイマイで水平曳きの方のそれは *Limacina helicina rangi* ミヂンウキマイマイ（南極型）で，*Euclio sulcata* ナンキョクウキビシがこれに次いだ．

Limacina helicina rangi は調査地域中南緯55°以南の区域に限られ，一方，暖水域に主分布域をもつ *L. inflata* ヒラマキウキマイマイや *L. lesueuri* は調査地域中の北半における地点に僅か出現した．St. 52, 59の垂直曳採集物中に多量に見られた *Limacina*属は幼貝のため同定不能であった．*Euclio sulcata* は既往の報告には印度洋，太平洋側の南緯46°～50°以南にのみ分布する南極洋独特の翼足類の一つである．（他に *Limacina helicina rangi*, 及び *Euclio antarctica*）

EXPLANATION OF PLATE 1

Euclio sulcata (PFEFFER)

Fig. 1. The dorsal view of the largest specimen (anterior part injured); 17.5 × 9.0 mm

2. The ventral view of the same.

3. The lateral view of the posterior part of the same.

4. The dorsal view of another specimen with more prominent ridges.

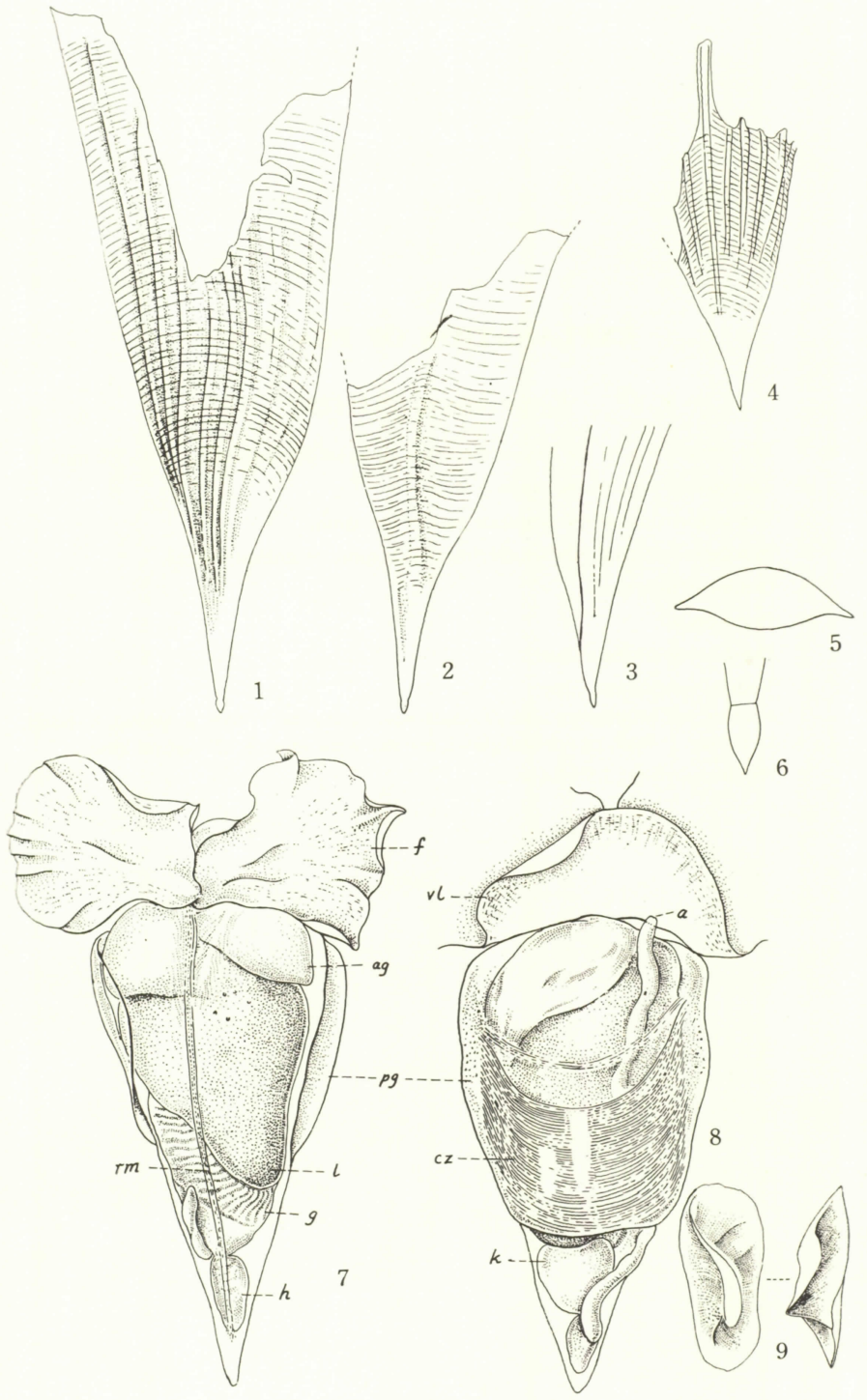
5. Outline of aperture.

6. Protoconch.

7. Dorsal view of the animal.

8. Ventral view of the same.
a: anus, ag: accessory gland, cz: crateriform cell zone, f: foot, g: gonad, h: heart, k: kidney, l: liver, pg: pallial gland, rm: retractor muscle, vl: ventral lobe.

9. Stomachal plate; 2.5 × 0.4 mm.



TAKI & OKUTANI: "Umitaka-Maru" Thecosomatous Pteropoda