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# THE FAUNA OF AKKESHI BAY

## II. CIRRIPIEDIA<sup>1)</sup>

BY

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(With 5 Text-figures and 1 Plate)

The little collection, forming the subject matter for this paper was kindly sent to the writer by Mr. S. OKUDA. It contains no new form or species. Still it is of some interest, as the cirripedian fauna in the northernmost part of Japan is little known, only a few scattered records being found in the reports of DARWIN (1854), WELTNER (1897), PILSBRY (1911, 1916), KRÜGER (1911) and HIRO (1931). The collection was taken mainly from Akkeshi Bay, on the east-southern coast of Hokkaidô, and includes the following 10 species:

### THORACICA

#### Suborder Lepadomorpha

##### Family Lepadidae

1. *Lepas anatifera* LINNÉ
2. *Lepas pectinata* SPENGLER
3. *Conchoderma auritum* (LINNÉ)
4. *Conchoderma virgatum* (SPENGLER)

#### Suborder Balanomorpha

##### Family Chthamalidae

5. *Chthamalus dalli* PILSBRY

##### Family Balanidae

6. *Balanus (Balanus) rostratus* HOEK
7. *Balanus (Balanus) crenatus* BRUGUIÈRE

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1) Studies on Cirripedian Fauna of Japan. I.

8. *Balanus (Semibalanus) cariosus* (PALLAS)
9. *Coronula diadema* (LINNÉ)

## RHIZOCEPHALA

10. *Peltogasterella socialis* KRÜGER

To this series the following will be added for description: *Balanus (Balanus) rostratus dalli* PILSBRY, *Balanus (Semibalanus) balanoides* (LINNÉ) and *Balanus (Hesperibalanus) hesperius* PILSBRY. These were taken from some unknown localities in Hokkaidô and are now preserved by the present writer.

As pointed out previously (HIRO, 1932b), the cirripedian fauna of Hokkaidô and the Kurile Islands consists mainly of the Northern Pacific and Arctic species; yet the southwestern part of Hokkaidô yields some shore forms that are found in temperate waters, such as *Mitella mitella* (LINNÉ) and *Chthamalus challengerii* HOEK. Therefore a comparison between the fauna of Akkeshi Bay and that of Mutsu Bay, northernmost of Honshû, which was previously reported by HIRO (1932a), is of some interest. However for a thorough study of the cirripedian fauna in this territory the material is lacking in shore species, especially of Balanidae.

Before proceeding further, the writer wishes to express sincere thanks to Professor T. UCHIDA, Director of the Akkeshi Marine Biological Station, who kindly placed the collection at his disposal and also to Mr. S. OKUDA and Mr. M. IWASA, of the Hokkaidô Imperial University and Mr. K. KOBAYASHI, of the Tôkyô College of Literature and Sciences who took much trouble in collecting the material.

1. *Lepas anatifera* LINNÉ, 1767.

Two specimens which were taken from a piece of floating wood, correspond with var. *testudinata* (AURIVILLIUS, 1892) of this species, of which the synonymy is discussed in NILSSON-CANTELL's paper (1928, pp. 12-15).

*Locality:* Akkeshi Bay. Collector—Mr. S. OKUDA. VIII, 1934.  
*Distribution:* Cosmopolitan, pelagic, usually on floating wood.

## 2. *Lepas pectinata* SPENGLER, 1793.

This species is represented by many specimens of very small size attached to a floating piece of charcoal. All of them are young and have not yet developed filamentary appendages.

*Locality*: Akkeshi Bay. Collector—Mr. S. OKUDA.

*Distribution*: Cosmopolitan, pelagic, usually on *Janthina* and other floating objects.

## 3. *Conchoderma auritum* (LINNÉ, 1767).

A small specimen attached to *Penella* and seven large ones attached to *Coronula diadema* (LINNÉ), both taken from the skin of a sperm whale, *Physeter macrocephalus* LINNÉ. Of these the largest one measures in mm:

Capitulum		Peduncle	
Length	Breadth	Length	Breadth
40	22	67	13

*Locality*: Akkeshi Bay. Collector—Mr. S. OKUDA. VII, 1934.

*Distribution*: Cosmopolitan, pelagic, usually on *Coronula diadema* on whales.

## 4. *Conchoderma virgatum* (SPENGLER, 1790).

Twenty six specimens of the typical form are attached to the parasitic copepod *Penella*, from a sperm whale *Physeter macrocephalus* LINNÉ, associated with a specimen of *Conchoderma auritum* (LINNÉ).

*Locality*: Akkeshi Bay. Collector—Mr. S. OKUDA. VII, 1934.

*Distribution*: Cosmopolitan, pelagic, usually on *Penella* and sea-snakes.

## 5. *Chthamalus dalli* PILSBRY, 1916.

(Text-figs. 1a-h)

*Chthamalus dalli*, HIRO (1932—Hakodate, Nemuro, Itrup).

As mentioned before (HIRO, 1932b), this species is closely related to *Chthamalus challengerii* HOEK, one of the commonest cirripeds

found on the coast of the mainland of Japan, but differs from the latter in the usually depressed shape with lower parietal ribs and in the simpler suture between the scuta and terga. The distinction may be found in the opercular valves also.

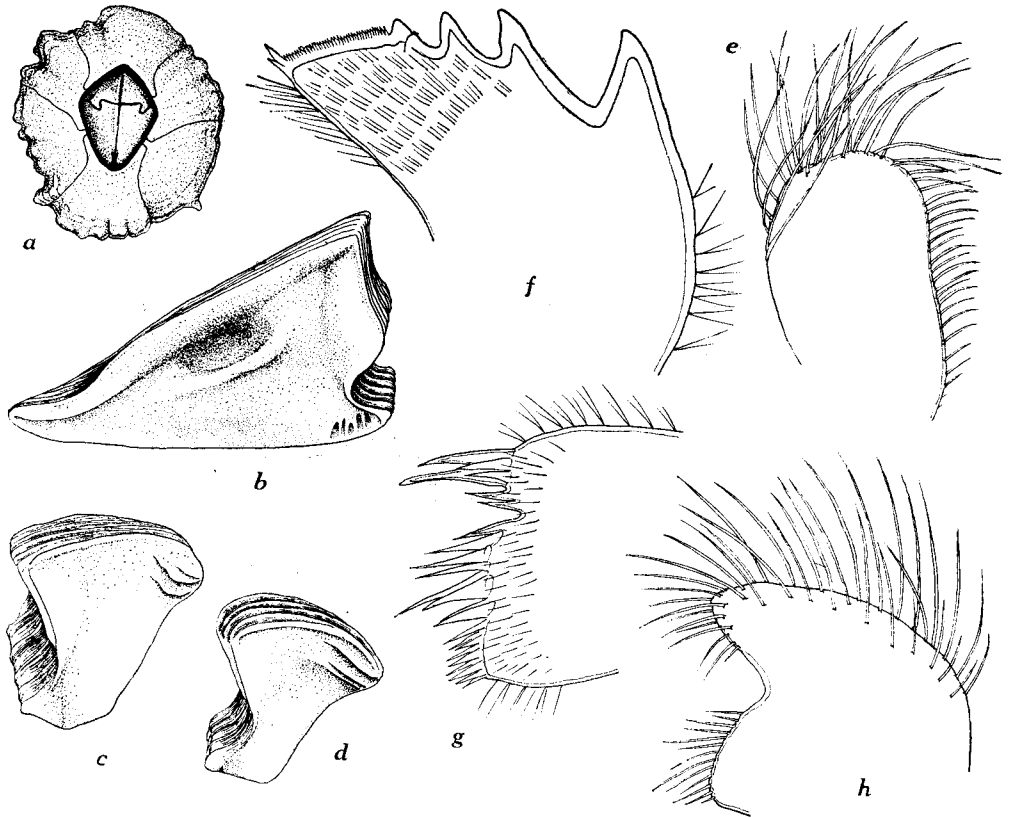


Fig. 1. *Chthamalus dalli* PILSBRY. a, Apical view of shell,  $\times 2\frac{2}{3}$ ; b, internal view of scutum,  $\times 13$ ; c, d, internal view of tergum,  $\times 13$ ; e, palpus; f, mandible; g, maxilla I; h, maxilla II.

It is of interest that obvious individual variation is shown by the specimens taken from four different localities. The ten small specimens on a fragment of rock and on *Balanus cariosus* (PALLAS) taken from Loc. 1 and the five on *Balanus cariosus* from Loc. 4 are of a depressed form and with a small orifice, and the parietal ribs

are marked only around the basal, almost corroded, edge. Most of them measure 6 mm in carino-rostral diameter and 2 mm in height and seem to be nearest to PILSBRY's type as regards the shape of the shell. The twenty specimens from Loc. 2 are rather tubular with a large orifice owing to their occurrence in crowd. They measure about 4 mm in carino-rostral diameter and 5 mm in height. The parietal ribs are indistinct. In the two specimens from Loc. 3, which have a carino-rostral diameter of about 10 mm and a height of 4 mm, the shell is rather conic and the numerous parietal ribs are distinct from apex to base. Yet the opercular valves have the obvious specific characters. Most of the specimens have the scutum with 4-5 distinct crests for the lateral depressor muscle and the tergum broad and with a strongly convex basal margin. Also there are specimens which have a rather narrower tergum, such as shown in Fig. 1d.

About the internal parts nothing need be added to PILSBRY's description (1916); the mouth-parts are illustrated in Figs. 1 e-h.

*Localities:* 1. Akkeshi Bay. Collector—Mr. S. OKUDA. 1935.  
2. Monshizu, Akkeshi Bay. Collector—Mr. M. IWASA. 20 VII, 1933.  
3. Kojima, Akkeshi Bay. Collector—Mr. M. IWASA. 10 VII, 1933.  
4. Oshoro (W. Hokkaidô). Collector—Prof. T. UCHIDA.

*Distribution:* Northern Pacific—Unalaska, Alaska; Oyster Bay, Wash., N. W. America (after PILSBRY, 1916); Nemuro, Hakodate (both Hokkaidô); Itrup Is. (after HIRO, 1932b). Intertidal form.

## 6. *Balanus (Balanus) rostratus* HOEK, 1883.

*Balanus porcatus*, WELTNER (1897—Hakodate).

*Balanus rostratus*, KRÜGER (1911—Nemuro).

This typical form, BROCH's *eurostratus*, was originally described by HOEK (1883) from Kôbe, Japan, and was afterwards recorded by other authors from various localities, such as Enoshima, Yokohama, Hakodate (WELTNER, 1897 as *Balanus porcatus*); Tôkyô Harbor (PILSBRY, 1911, 1916); Nemuro, Sagami Bay, Yokohama (KRÜGER, 1911 as *Balanus crenatus* in part); Mutsu Bay (HIRO, 1932); Kuji, Shiriya-zaki, Korea Strait (HIRO, 1933). While the species is not

found in Southern Japan, it occurs rather commonly in the far north and includes the following subspecies: *B. r. alaskensis*, *B. r. heteropus*, *B. r. apertus*, *B. r. dalli*, *B. r. suturalis* and *B. r. spiniferus*. Thus one recalls PILSBRY's note (1916, p. 140)—“The large development of *rostratus* forms in the north, where other related species exist, seems to indicate that *B. r. heteropus* and typical *B. rostratus* are peripheral southern forms derived from the north. No related species are found farther south.”

The typical *rostratus* are represented in this collection by five small specimens embedded in a sponge; these are all snow-white and measure about 9 mm in carino-rostral diameter and 16 mm in height.

*Locality*: Nakanose, Akkeshi Bay, 3 fms. Collector—Mr. M. IWASA. 2 VIII, 1933.

*Distribution*: Northwestern Pacific—Japan (typical form) in 3–90 fathoms.

#### 7. *Balanus (Balanus) rostratus dalli* PILSBRY, 1916.

(Pl. X, Figs. 1, 2)

The original description by PILSBRY is as follows:

“The form attains a large size and is quite solid; external surface smooth; radii very little sunken, moderately wide. Parietal tubes large and square, with one or two interseptal ribs on the inner lamina; these tubes having transverse septa about half way down, the lower half being open. Inside of the parietes sharply ribbed to the sheath (or in some old individuals, becoming nearly smooth above).”

The type of this subspecies was found attached to a very large valve of *Placunanomia* taken from Unalaska, Bering Sea. The two specimens dealt with here are preserved dry and without the internal parts. They are attached to a large valve of *Pecten (Patinopecten) yessoensis* JAY. In the largest specimen the carino-rostral diameter is 39 mm and the height 35 mm.

The opercular valves have not been described and figured before; they show a close resemblance to those of the typical *rostratus* as well as of the subspecies *apertus* PILSBRY, 1911.

*Locality*: Hokkaidô (without exact locality). Donor—Mr. N. ISHIKAWA.

*Distribution*: Unalaska, Aleutian Is., Kyska Harbor, Plover Bay (Siberia).

8. *Balanus (Balanus) crenatus* BRUGUIÈRE, 1789.

(Pl. X, Fig. 4; Text-figs. 2a-f)

The numerous specimens which are probably to be referred to this species, are attached to the shells of a gastropod, *Neptunea arthritica* (?) BERNARDI.

The shell is usually conic, not fragile, white, and the parietes are rugged and irregularly folded longitudinally. Thus the form apparently resembles the European form of the typical species, such as that shown in PILSBRY's paper of 1916, pl. 39, fig. 1 and also in BROCH's paper of 1924, Taf. 1, Fig. 6. The parietal tubes in the rostrum generally number 12. The radii have oblique upper margins and are rather narrow, but sometimes they are rather wide in the rostrum and also in the lateral compartment. The orifice is large, rhomboidal to nearly oval, and slightly notched.

In size the specimens are rather small, the largest one measuring 18 mm in diameter and 10 mm in height.

The opercular valves are more like those of *Balanus crenatus curviscutum* PILSBRY, 1916 than those of the typical *crenatus*. PILSBRY describes the former form as follows:

"The scutum is usually warped strongly, externally concave between base and apex. It has an *unusually long basal margin*, equal to or exceeding the tergal margin, is thin, and smooth inside, without callouses or distinct muscle impressions. The articular ridge is thin and well reflexed.

"The tergum has *the spur narrower than in crenatus*, the articular ridge forms a triangular projections overhanging the furrow and scutal margin. The scutal border is rather broadly inflected at a right angle with the face of the valve."



The scutum in these specimens is quite concave externally while the muscle impressions are rather indistinct and without the adductor ridge. The basal margin may be convex and the basitergal angle is rather rounded in the young specimens (Fig. 2a). In the larger ones, however, the basal margin is nearly straight and the basitergal corner is right-angled. The basal margin is always much longer than the tergal margin; this is especially the case with the

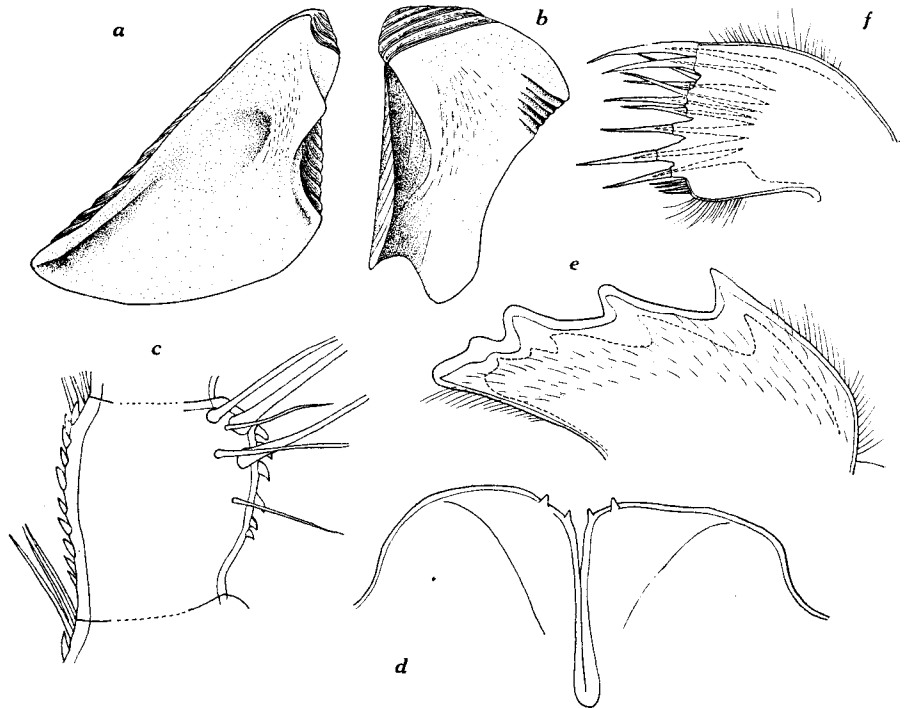


Fig. 2. *Balanus crenatus* BRUGUIÈRE. a, Internal view of scutum in a young specimen,  $\times 10$ ; b, internal view of tergum,  $\times 10$ ; c, sixth segment of cirrus IV; d, labrum; e, mandible; f, maxilla I.

larger specimens. The tergum has a rather narrow spur and 6 crests for the depressor muscle.

Mouth-parts: The labrum has 2 acute teeth on each side of the median deep notch.

The mandible has three or four distinct but obtuse teeth; the fifth tooth is rudimentary and nearly confluent with the lower angle.

The maxilla I has a small notch below the upper pair of spines. Below the notch the frontal edge is irregularly indented between spines of different size. Of the spines the one next to the lower is the largest and longest.

The cirri have the following number of segments in their rami:

Sp. diam. 17 mm.	$\overbrace{\quad\quad}^{\text{I}}$ 16 10	$\overbrace{\quad\quad}^{\text{II}}$ 11 11	$\overbrace{\quad\quad}^{\text{III}}$ 14 13	$\overbrace{\quad\quad}^{\text{IV}}$ 27 28	$\overbrace{\quad\quad}^{\text{V}}$ 31 30	$\overbrace{\quad\quad}^{\text{VI}}$ 23* 33
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In cirrus I the posterior ramus is about half as long as the anterior. The remaining cirri have subequal rami in each cirrus. In cirri III and IV, the outer face of the lower segments of both rami has teeth near or on the anterior and posterior borders.

According to PILSBRY, the smooth, rather cylindric shape of shell and the thin, weak walls, as well as the characters of the opercular valves mentioned above, are all characteristic of the subspecies *curviscutum*. The present specimens, however, have a close resemblance to the typical form in external appearance, though the opercular valves are much like those of *curviscutum*. The size of spur of the tergum in *Balanus crenatus* is variable, as shown in many figures of PILSBRY. The spur of tergum of the specimens in this collection is rather narrow, but in its shape it resembles that of the typical form more than that of *curviscutum* which seems to be rather obtusely pointed, judging from PILSBRY's figures. The other characters agree well with those of *curviscutum*.

As to the distribution of this species, the typical form of *Balanus crenatus* is widely distributed in colder waters, yet it has never been found in Japanese waters. NILSSON-CANTELL (1931) reported this from Santuaao, Fukien, Southern China. But it is possible that they had been carried to the spot by ships from colder waters. From Japan a variety *curviscutum* has been found off Suno Saki, Honshû and off the southwest coast of Karafuto (Saghalin). In spite of this, it is impossible, owing to imperfect records, to determine whether the

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\* mutilated.

Japanese form belongs to the variety *curviscutum* of *Balanus crenatus* or some other local variety. Therefore it seems suitable to record the specimens from Akkeshi Bay as *Balanus crenatus* in the more general sense.

*Locality*: Akkeshi Bay. Collector—Mr. S. OKUDA.

*Distribution*: Northern Atlantic, Arctic, Northern Pacific.

9. *Balanus* (*Semibalanus*) *balanoides* (LINNÉ, 1766).

(Text-figs. 3a-d)

The few specimens taken from the carapace of a crab, *Paralithodes camtschatica* (TILESIIUS), preserved dry without internal parts,

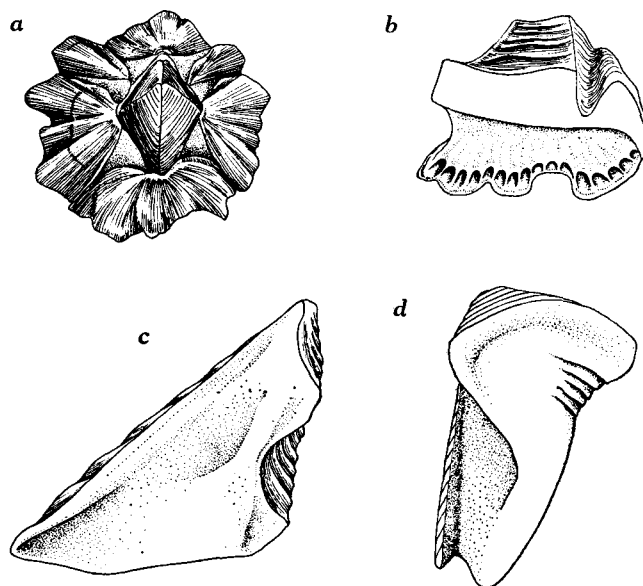


Fig. 3. *Balanus balanoides* (LINNÉ). *a*, Apical view of shell,  $\times 5$ ; *b*, internal view of lateral compartment,  $\times 7$ ; *c*, internal view of scutum,  $\times 14$ ; *d*, internal view of tergum,  $\times 14$ .

are very small, measuring 6 mm in carino-rostral diameter and 1.5 mm in height. But the shell and opercular valves agree well with those of *Balanus balanoides* (LINNÉ).

The internal surface of the parietes is smooth, but a slight rib runs obliquely to the base, from the lower point of the ala to the base of the radius. The internal part of the radius is grooved. The parietal tubes are small, rounded and transversely septate from apex to base. Externally the surface is coarsely folded or rather smooth. The orifice is large, rhombic. The base is membranous.

The opercular valves resemble those of *Balanus crenatus* and agree closely with the previous description of this species.

*Locality*: Hokkaidô (without exact locality). Donor—Prof. Yô K. OKADA.

*Distribution*: Southern part of Arctic, Northern Atlantic, North Sea, Skagerrak, Kattegat, Northern Pacific (previously Alaska).

#### 10. *Balanus (Semibalanus) cariosus* (PALLAS, 1788).

(Pl. X, Fig. 3; Text-figs. 4a-c)

*Balanus cariosus*, DARWIN (1854—Kurile Islands); WELTNER (1897—Hakodate); KRÜGER (1911—Itrup, Todohokke); PILSBRY (1916—Tôkyô Bay?); HIRO (1932—Itrup).

This species has been described fully by DARWIN, KRÜGER and PILSBRY. It is very common in the littoral zone in Hokkaidô and in the Kurile Islands north to Bering Sea. Thus the cirriped is obviously an inhabitant of colder waters of the Northern Pacific. GRUVEL's report (1903, 1905) of this species from Cochin China and PILSBRY's (1916) from Tôkyô (as Jedo) Bay seem incredible. But the writer has ascertained its occurrence in Onakawa, Pacific coast of the northern part of Honshû; and this may be about the southern limit of the distribution of this species.

Measurements in mm: -Diameter 50	Height 28 (Akkeshi)
"    42	"    30 (Oshoro)
"    40	"    28 (Akkeshi)

#### *Localities*:

1. Akkeshi Bay. Collector—Mr. S. OKUDA.
2. Aikappu, Akkeshi Bay. Collector—Mr. M. IWASA. 5 VII, 1933.

3. Oshoro. Collector—Prof. T. UCHIDA. VIII, 1934.
4. Murakami Bay, Paramushiru Is. (Northern Kurile), on *Nucella lima freycineti* (DESHAYES) and *Patelloidea (Tectura) cassis pelta* (ESCHSCHOLTZ). Collector—Mr. K. Koba. 17 VIII, 1931.
5. Kitaura, Araitō Is. (Northern Kurile). Collector—Mr. K. Koba. 17 VIII, 1931.

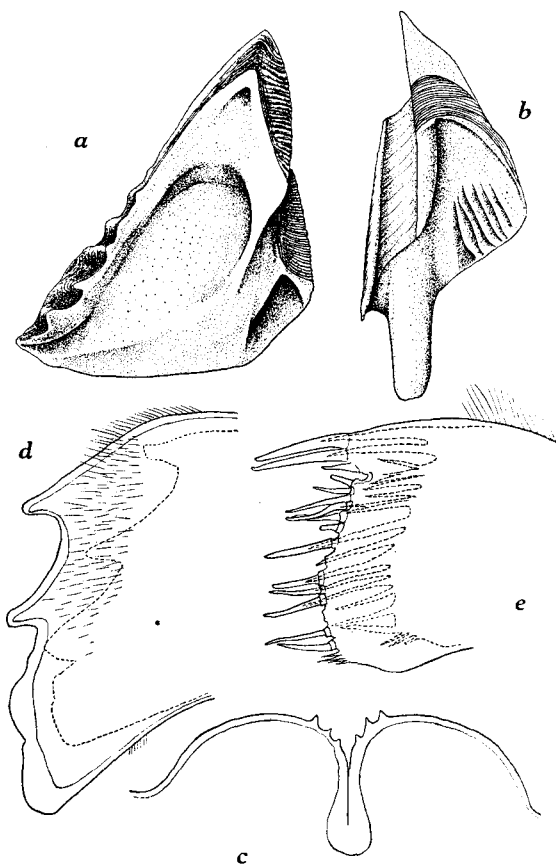


Fig. 4. *Balanus cariosus* (PALLAS). *a*, Internal view of scutum,  $\times 4$ ; *b*, internal view of tergum,  $\times 4$ ; *c*, labrum; *d*, mandible; *e*, maxilla I.

*Distribution*: Hokkaidō, Kurile Islands, Aleutian Islands, West coast of Canada as far south as Puget Sound.

11. *Balanus (Hesperibalanus) hesperius* PILSBRY, 1916.

As far as known to the writer, this species has never been recorded since the original report of PILSBRY; therefore the present rediscovery is of interest. It is represented by only a dry specimen attached to the carapace of a crab, *Paralithodes camtschatica* (TILESIUS), associated with *Balanus balanoides*.

The shell is small, conic, white and smooth. The radii are broad; the lower margin is closely attached to the pariete of the adjoining compartment, the upper margin is nearly straight and oblique to the base. The alae are broad and with nearly horizontal summits. The parietes are solid and poreless.

Carino-rostral diameter 14 mm; height 9 mm.

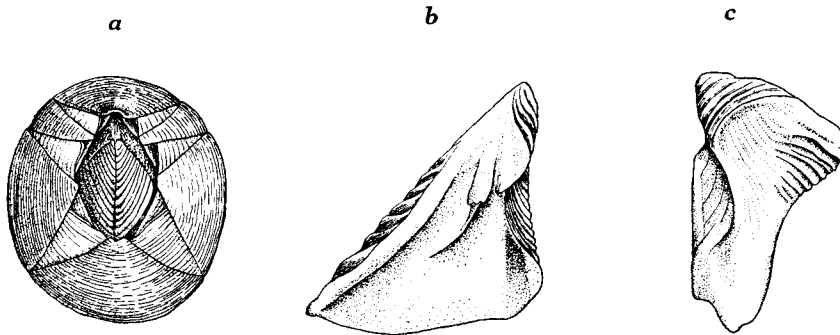


Fig. 5. *Balanus hesperius* PILSBRY. *a*, Apical view of shell,  $\times 2\frac{1}{3}$ ; *b*, internal view of scutum,  $\times 5$ ; *c*, internal view of tergum,  $\times 5$ .

The scutum is highly characteristic in having the following features—"the articular ridge is very high, reflexed, and usually ends in a point; adductor ridge very short, passing upward into a heavy callus between the articular ridge and the deep pit of the adductor muscle, *this callus being cut into several sharp ridges*, which typically terminate downward in teeth (PILSBRY, 1916, p. 193)." The external surface of the valve is furnished with rather closely-set growth-ridges over which there are slight longitudinal striations.

The tergum is flat externally, though with a slight depression along the spur. The spur is short with a rounded end. There are 9 long crests, of which 7 are distinct, for the carinal depressor muscle.

The internal parts are dried and in a poor condition.

*Locality*: Hokkaidô (without exact locality). Donor—Prof. Yô K. OKADA.

*Distribution*: Alaska, Bering Sea.

### 12. *Coronula diadema* (LINNÉ, 1767).

This species is represented here by a fully grown specimen taken from a sperm whale, *Physeter macrocephalus* LINNÉ.

Carino-rostral diameter 54 mm; height 48 mm.

*Locality*: Akkeshi Bay. Collector—Mr. S. OKUDA. VIII, 1934.

*Distribution*: Probably cosmopolitan, pelagic, on whales.

### 13. *Peltogasterella socialis* KRÜGER, 1912.

(Pl. X, Fig. 5)

This curious rhizocephalan was first discovered from Sagami Bay, central Japan, and described very briefly by KRÜGER (1912). POTTS (1915), afterwards, gave three figures of a hermit-crab with this rhizocephalan collected in Puget Sound, American coast of the northeastern Pacific. Recently BOSCHMA (1933) studied the anatomy of the materials from the same locality. In the present collection from Akkeshi Bay are included some specimens of this species attached to an individual of *Eupagurus spinimanus* (BRANDT). The parasites are somewhat bent, club-shaped and have a length of 5.5 mm and a thickness of 1.5 mm. This new locality may be looked upon as connecting the previously known localities of this species on the two sides of the Pacific. Thus the hosts and localities of this curious parasite so far known are as follows:

Authors	Host	Localities
KRÜGER (1912)	Pagurid	Fukuura, Sagami Bay
"	Pagurid	St. Olga Bay, Siberia
"	<i>Eupagurus middendorffi</i> (BRANDT)	Vladivostok, Siberia
POTTS (1915)	<i>Eupagurus alaskensis</i> BENEDICT	Friday Harbor
BOSCHMA (1933)	<i>Eupagurus alaskensis</i> BENEDICT	Friday Harbor
HIRO (1935)	<i>Eupagurus spinimanus</i> (BRANDT)	Akkeshi Bay

× × ×

It seems suitable here, in addition to the report of the Thoracic Cirripedia collected from Hokkaidô and the Kurile Islands, to give a review not only of the species known to occur in these waters, but also of those which are likely to be found by further study. In the following list, the species hitherto recorded from northern Japanese waters are printed in Roman types, the species which are likely to be found by future investigation are printed in *Italic* types, those

	Honshû	Hokkaidô	Kurile Is.	Bering S.
<i>Mitella mitella</i> (LINNÉ) .....	+	+		
* <i>Lepas anatifera</i> LINNÉ .....	+	+		+
— <i>hilli</i> (LEACH) .....	+			+
— * <i>pectinata</i> SPENGLER .....	+	+		+
— <i>fascicularis</i> ELLIS & SOLANDER ...	+			+
* <i>Conchoderma auritum</i> (LINNÉ) .....	+	+		+
— * <i>virgatum</i> (SPENGLER) .....	+	+		
<i>Heteralepas japonica</i> (AURIVILLIUS) ....	+	+		
<i>Chthamalus challenger</i> HOEK .....	+	+		
— * <i>dalli</i> PILSBRY .....		+	+	+
* <i>Balanus rostratus</i> HOEK .....	+	+		
— <i>rostratus alaskensis</i> PILSBRY .....				+
— <i>rostratus apertus</i> PILSBRY .....				+
— <i>rostratus dalli</i> PILSBRY .....		+		+
— <i>balanus</i> (LINNÉ) .....		?	+	+
— * <i>crenatus</i> BRUGUIÈRE .....		+	+	+
— <i>crenatus curviscutum</i> PILSBRY ....	+	?		+
— <i>glandula</i> DARWIN .....				+
— <i>balanoides</i> (LINNÉ) .....		+		+
— <i>balanoides calcaratus</i> PILSBRY ....				+
— * <i>cariosus</i> (PALLAS) .....	+	+	+	+
— <i>hesperius</i> PILSBRY .....		+		+
— <i>hesperius laevidomus</i> PILSBRY ....				+
— <i>hoekianus</i> PILSBRY .....				+
— <i>evermanni</i> PILSBRY .....			+	+
<i>Acasta spongites</i> (POLI) .....	?	?		
* <i>Coronula diadema</i> (LINNÉ) .....	+	+		+
<i>Cryptolepas rachianecti</i> DALL .....				+



marked with an asterisk being included in the collection of Akkeshi Bay.

As shown in this list, the cirripedian fauna in the northern Pacific waters is rather poor as compared with that of Alaskan waters, still it gives students some hints as to the geographic character of the waters concerned. The pelagic form, i.e. *Lepas*, *Conchoderma* and *Coronula*, included in the above list, is widely distributed to the far north in colder waters, as well as to the far south in tropical waters. The absence of the deep-sea forms like *Scalpellum* in this list seems striking. Whether this is due to the scarcity of such forms in these waters or simply to the limited exploration of that region remains to be elucidated in future. The littoral fauna consists mainly of Subarctic or Arctic species, while the temperate forms are very scarce and represented in this list only by *Mitella mitella* and *Chthamalus challengerii*, which are found in the southwestern part of Hokkaidô, near Honshû. No species of *Balanus* occurring in the northern waters with the exception of *Balanus rostratus*, *Balanus crenatus* and *Balanus cariosus* have hitherto been found in Honshû, and these exceptional species are more related to colder waters. This fact indicates that the boundary between Hokkaidô and Honshû (namely Tsugaru Strait) may correspond to the line of demarcation between the geographical ranges of the colder and temperate animals in general. However, for a decisive statement, a thorough study is needed. It may be of interest to pursue the southern limit of the colder forms, such as *Balanus crenatus*, *B. balanoides*, *B. cariosus*, *B. hesperius* and *B. balanus*, in the northwestern Pacific region. At the same time the distribution in Hokkaidô of the intertidal forms found commonly in the mainland of Japan requires a thorough investigation.

The present collection, though rather meagre, gives a hint as to the immense interest and value of a thorough investigation of the cirripedian fauna in the territory of Hokkaidô.

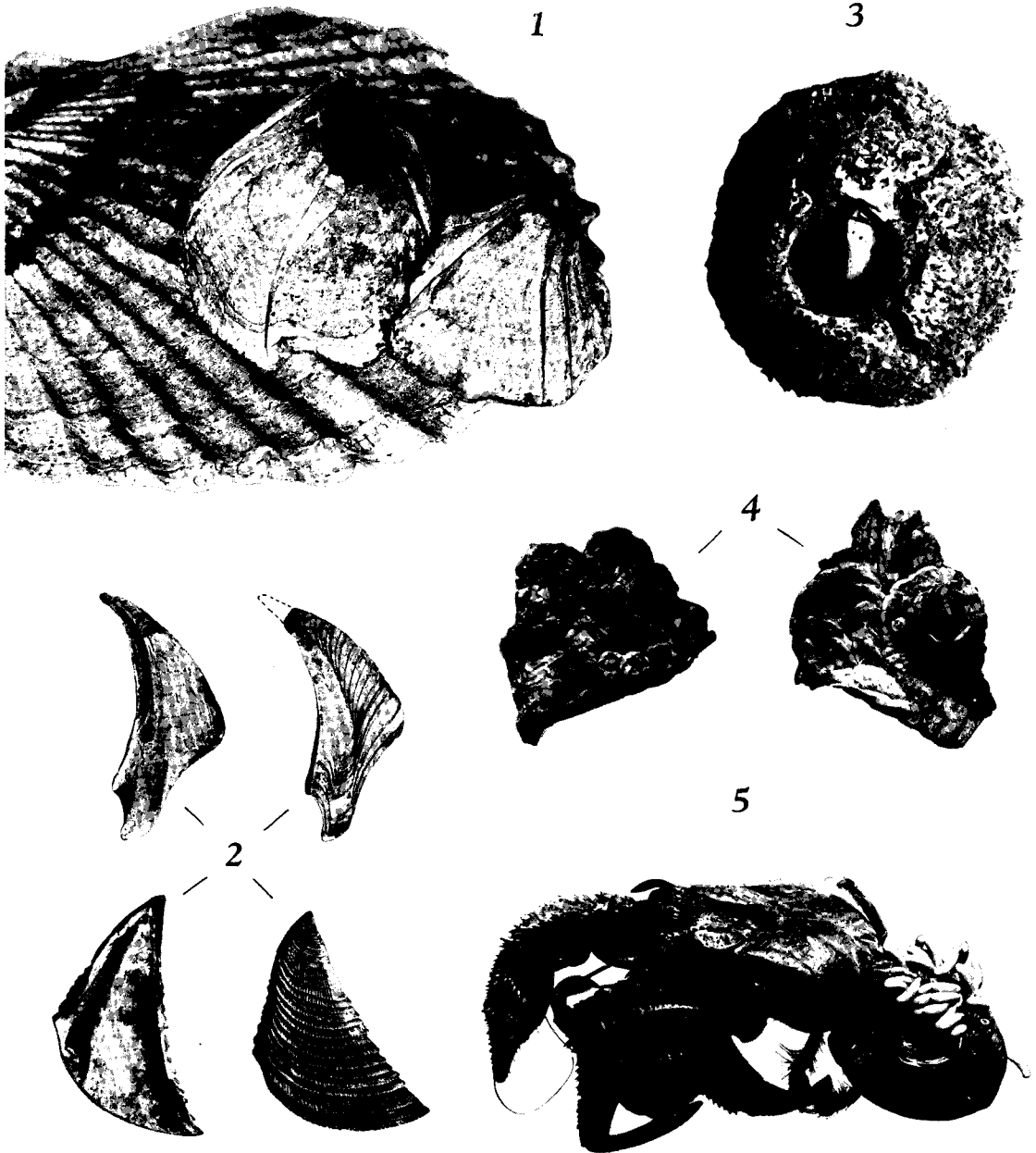
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**Plate X**

### Explanation of Plate X

- Fig. 1. *Balanus rostratus dalli* PILSBLY, attached to a valve of *Pecten* (*Patinopecten*) *yessoensis* JAY.  $\times 1$
- Fig. 2. Opercular valves of *Balanus rostratus dalli* PILSBRY.  $\times \frac{3}{2}$
- Fig. 3. *Balanus cariosus* (PALLAS).  $\times 1$
- Fig. 4. *Balanus crenatus* BRUGUIÈRE.  $\times 1$
- Fig. 5. *Peltogasterella socialis* KRÜGER, attached to a specimen of *Eupagurus spinimanus* (BRANDT).  $\times 1$



*F. Hiro: Cirripedia of Akkeshi Bay*