STUDIES ON THE CIRRIPEDIAN FAUNA OF JAPAN - VIII. THORACIC CIRRIPEDS FROM WESTERN KYUSYU-

Author(s)  Utinomi, Huzio

Citation  PUBLICATIONS OF THE SETO MARINE BIOLOGICAL LABORATORY (1962), 10(2): 211-239

Issue Date  1962-12-31

URL  http://hdl.handle.net/2433/175313

Type  Departmental Bulletin Paper

Textversion  publisher

Kyoto University
STUDIES ON THE CIRRIPEDIAN FAUNA OF JAPAN
VIII. THORACIC CIRRIPEDS FROM WESTERN KYUSYU

Huzio UTINOMI
Seto Marine Biological Laboratory, Sirahama

With 12 Text-figures

Introduction

This paper deals with three important collection of the thoracic cirripeds recently gathered from the coastal waters of western Kyusyu. They consist of:

1. The material collected by Mr. Kinzo MATSUBAYASHI of the Nomo Primary School at Nomosaki, Nagasaki Prefecture during the years 1960-1961. (Abbreviation: M)

2. The material collected by Dr. Tadashige HABE during the marine faunal survey conducted in the sea around the Amakusa Marine Biological Laboratory of Kyushu University, Tomioka, Kumamoto Prefecture during the years 1957 to 1959 (Abbreviation: T).

3. The material collected by the general benthonic survey in the Ariake Sea, conducted by the Hama Branch of the Seikai Regional Fisheries Research Laboratory (chief: Mr. Wataru IKEMATSU) during the years 1957-1958. (Abbreviation: A)

Among them, Mr. MATSUBAYASHI's collection is the most significant, as it contains two new species and two unrecorded species. In addition, the description of a hitherto unknown barnacle (Tetraclita multicostata) obtained by Dr. Shizuo MAWATARI of the Research Institute for Natural Resources at Makurasaki, Kagosima Prefecture is also included.

In Part VI of this series on the Cirripedian fauna of Japan (UTINOMI, 1949), I summarized all the known species hitherto collected at various localities of Kyusyu and Ryukyu Islands. A large part of them comprized the material which

1) Contribution from the Seto Marine Biological Laboratory, No. 390 and Contributions from the Amakusa Marine Biological Laboratory (Kyushu University), No. 166.
2) Supported in part by a grant-in-aid (‘62-4064) from the Scientific Research Fund of the Ministry of Education.

I had collected at Tomioka, where the Amakusa Marine Biological Laboratory is located, and enumerated about thirty five species and varieties in all.

In the past prior to my 1949 paper, some of the papers had appeared dealing in part with the cirripeds from the western Kyusyu. Aurivillius (1892, 1894), Weltner (1897), Pilsbry (1897, 1907, 1911, 1916, 1928), Krüger (1911), Nilsson-Cantell (1921, 1925) and Broch (1931) had sporadically contributed to the study of western Kyusyu cirripeds. Most of these earlier references, however, have mainly treated the deep-water forms obtained by dredging or trawling off Kagosima Gulf, Gotō Islands and Hirado Strait.

As a supplement to my former paper, the present collections treated in this paper, on the other hand, represent the intertidal or shallow-water forms (at least down to 30 meters in depth) and contain in all forty one species and varieties, of which three (Acasta umitosaka, Pyrgoma oulastreae and Tetraclita pilsbryi) are described as new species, and four (Balanus quadrivittatus, B. cornutus, B. navicula and Tetraclita multicostata) are recorded for the first time from Japanese waters.

Before going further, I like to express my gratitude to the Institutions and persons mentioned above for the opportunity of examining these precious collections.

**List of the Species**

**Scalpellidae**

1. *Smilium scorpio* (Aurivillius) .................................................. 214

**Ibla**

2. *Ibla cumingi* Darwin ............................................................ 214

**Oxynaspidae**

3. *Oxynaspis pacifica* Hiro .................................................... 214

**Lepadidae**

4. *Lepas anserifera* Linne ...................................................... 214

**Heteralepadidae**

5. *Heteralepas quadrata* (Aurivillius) ......................................... 214
6. *Paralepas distincta* (Utinomi) ............................................... 215
Studies on the Cirripedian Fauna of Japan, VIII

Chthamalidae

7. *Chthamalus challengeri* Hoek ...................................................... 215

Balanidae

8. *Balanus (Megabalanus) tintinnabulum rosa* Pilsbry .......................... 215
9. *Balanus (Balanus) amphitrite hawaiensis* Broch .............................. 215
10. *Balanus (Balanus) amphitrite krügeri* Nilsson-Cantell ..................... 216
11. *Balanus (Balanus) amphitrite albicostatus* Pilsbry ........................ 216
12. *Balanus (Balanus) amphitrite cirratus* Darwin .............................. 216
13. *Balanus (Balanus) amphitrite communis* Darwin .............................. 216
14. *Balanus (Balanus) poecilotheca* Krüger ........................................ 216
15. *Balanus (Balanus) trigonus* Darwin .......................................... 216
16. *Balanus (Chirona) tenuis* Hoek ................................................. 216
17. *Balanus (Chirona) amaryllis* Darwin .......................................... 216
18. *Balanus (Solidobalanus) socialis* Hoek ....................................... 217
19. *Balanus (Armatobalanus) allium* Darwin ...................................... 217
20. *Balanus (Armatobalanus) cepa* Darwin ....................................... 217
21. *Balanus (Armatobalanus) quadriovittatus* Darwin .......................... 217
22. *Balanus (Conopea) calceolus* Darwin .......................................... 218
23. *Balanus (Conopea) nasica* Darwin ............................................. 219
24. *? Balanus (Conopea) cornutus* Hoek ........................................... 219
25. *Balanus (Conopea) cymbiformis* Darwin ...................................... 220
26. *Balanus (Conopea) granulatus* Hiro ........................................... 220
27. *Acasta pectinipes* Pilsbry ....................................................... 221
28. *Acasta dojleini* Krüger .............................................................. 221
29. *Acasta japonica* Pilsbry ......................................................... 221
30. *Acasta echinata* Hiro ................................................................. 224
31. *Acasta umitosaka* n. sp ............................................................. 224
32. *Pyrgoma spinulosum forma euspinulosa* (Broch) ............................. 226
33. *Pyrgoma spinulosum forma secunda* (Broch) .................................. 227
34. *Pyrgoma spinulosum forma acuta* (Hiro) ...................................... 227
35. *Pyrgoma indicum* Annandale ...................................................... 227
36. *Pyrgoma cancellatum* Leach ....................................................... 227
37. *Pyrgoma oulastreae* n. sp ........................................................... 227
38. *Tetraclita (Tetraclitella) chinensis* Nilsson-Cantell ....................... 231
39. *Tetraclita (Tetraclitella) multicostata* Nilsson-Cantell .................. 231
40. *Tetraclita (Tetraclitella) pilsbryi* n. sp .................................... 234
41. *Tetraclita (Tetraclitella) darwini* Pilsbry ................................... 237
Systematic Account

Suborder LEPADOMORPHA PILSBRY
Family Scalpellidae PILSBRY
Genus Smilium GRAY

1. *Smilium scorpio* (AURIVILLIUS, 1892)

For synonymy see HIRO, 1933, p. 13.

Occurrence: Tomioka, Amakusa Is. One specimen. 1957. (T-2)

Remarks: This scalpellid was first described as *Scalpellum scorpio* by AURIVILLIUS (1892, 1894) from Hirado Strait, 80 m in depth and then described as *Scalpellum sexcornutum* by PILSBRY (1897) from Inland Sea (31°31' Lat. N., 133°44' Long E.), 40 m. This species seems to be intermediate morphologically between the typical *Smilium* and the typical *Calantica*.

Family Iblidae ANNANDALE
Genus Ibla LEACH

2. *Ibla cumingi* DARWIN, 1851


Family Oxynaspidae (GRUVEL) NILSSON-CANTELL
Genus Oxynaspis DARWIN

3. *Oxynaspis pacifica* HIRO, 1931

Occurrence: Nomosaki. One specimen on *Antipathes japonica*. IX-1960. (M-16)

Family Lepadidae (DARWIN) NILSSON-CANTELL
Genus Lepas LINNÉ

4. *Lepas anserifera* LINNÉ, 1767

Occurrence: Nomosaki. 16 specimens on buoys. 18-IX-1960. (M-12)

Family Heteralepadidae NILSSON-CANTELL
Genus Heteralepas s. str. PILSBRY

5. *Heteralepas quadrata* (AURIVILLIUS, 1892)

Occurrence: Tomioka. Two specimens on abdomen of *Charybdis japonica*,
infested by a *Sacculina*. 1957. (T-9)

Genus *Paralepas* s. str. (PILSBRY) NEWMAN


*Heteralepas (Paralepas) distincta* UTINOMI, 1949, p. 26, figs. 1, 2 c–d.

**Occurrence:** Nomosaki. Six specimens on legs of a crab *Maja spinigera*. IX-1960. (M-14)

**Remarks:** This species was first described from Tomioka, as living on the buccal region of a spiny lobster *Panulirus japonicus*.

Suborder BALANOMORPHA PILSBRY

Family Chthamalidae DARWIN

Genus *Chthamalus* RANZANI

7. *Chthamalus challengeri* HOEK, 1883


Family Balanidae GRAY

Subfamily Balaninae DARWIN

Genus *Balanus* DA COSTA

Subgenus *Megabalanus* HOEK

8. *Balanus tintinnabulum rosa* PILSBRY, 1916

**Occurrence:** Nomosaki. Seven specimens on shells of *Turbo cornutus* obtained by a net “Kasiami”. 30-XII-1960. (M-43)

Nomosaki. Several specimens on buoys. VIII-1960. (M-44)

Subgenus *Balanus* DA COSTA

9. *Balanus amphitrite hawaiensis* BROCH, 1922

**Occurrence:** Nomosaki. Several specimens. 6-VIII-1960 (M-1). IX-1960 (M-2).
10. *Balanus amphitrite krügeri* Nilsson-Cantell, 1932

**Occurrence**: Nomosaki. VIII-1960. (M-3)
Hama, Saga Pref. 19-VI-1942. S. Inuo coll.

11. *Balanus amphitrite albicostatus* Pilsbry, 1916

**Occurrence**: Wakimisaki, near Nomosaki. Several specimens. 16-X-1960. (M-18)

12. *Balanus amphitrite communis* Darwin, 1854

**Occurrence**: Nomosaki. On angler-ropes. 23-X-1960. (M-21)

13. *Balanus amphitrite cirratus* Darwin, 1854

**Occurrence**: Nomosaki. On angler-ropes. 16-X-1960. (M-20)

14. *Balanus poecilotheca* Krüger, 1911

Nomosaki. Four specimens on a hydroid *Eudendrium* obtained by a net “Kasiami”. VIII-1960. (M-39)

15. *Balanus trigonus* Darwin, 1854


- **Subgenus Chirona** Gray

16. *Balanus tenuis* Hoek, 1883

For synonymy see Nilsson-Cantell (1925, p. 34) and Hiro (1937, p. 439).

**Occurrence**: Nomosaki. Eight specimens on dead shells obtained by a net “Kasiami”. IX-1960. (M-8)

17. *Balanus amaryllis* Darwin, 1854

**Occurrence**: Entrance of Ariake Sea. -30 clusters. 17-23-XII-1957. (A)
Ariake Sea, 10-30 m. 6 specimens. 18-22-XI-1958. (A)
Subgenus *Solidobalanus* Hoek

18. *Balanus socialis* Hoek, 1883

**Occurrence**: Numerous specimens collected at various stations in Ariake Sea, 10-50 m in depth. IX-1957, XII-1957, IX-1958, XI-1958. (A)

Subgenus *Armatobalanus* Hoek

19. *Balanus allium* Darwin, 1854

For synonymy and description see Utinomi, 1949, p. 12, fig. 3.

**Occurrence**: Nomosaki. Three specimens on *Cyathelia axillaris* obtained by a net “Kasiami”. 17-IX-1960. (M-11)

Nomosaki. Three specimens on *Dendrophyllia micranthus* obtained by a net “Kasiami”. VIII-1960. (M-35)

20. *Balanus cepa* Darwin, 1854

For synonymy and description see Nilsson-Cantell, 1938, p. 52 and Utinomi, 1949, p. 29.

**Occurrence**: Nomosaki. Three specimens on stones and dead shells obtained by a net “Kasiami”. 11-XII-1960. (M-34)

**Remarks**: This small balanid was first described by Darwin (1854) from unknown locality of Japan. Later it was recorded by Pilsbry (1916) from Mogi, Nagasaki Pref. and by Utinomi (1939) from Tomioka, Kumamoto Pref.

21. *Balanus quadrivittatus* Darwin, 1854

*Balanus quadrivittatus* Darwin, 1854, p. 284, Pl. 8, fig. 1; Hoek, 1913, p. 213, Pl. 21, figs. 15-20, Pl. 22, figs. 1-2; Pilsbry, 1916, p. 229; Nilsson-Cantell, 1938, p. 54; Kolosváry, 1947, p. 425.

**Occurrence**: Nomosaki. Six small specimens attached to the stalk of an alcyonarian *Dendronephthya* taken by a net “Kasiami”. 7-XI-1960. (M-24)

**Remarks**: The specimens before me measure in mm as follows:

| Carino-rostral diameter | 1.5 | 1.8 | 2 | 2.9 | 3 |
| Height                  | 2   | 2   | 3 | 3   |

The surface of parietes are roughened, only slightly ribbed. Their basal circumference is rather serrate as in *Balanus terebratus* and *B. filigranus*. But the wall bears four longitudinal dark gray bands placed crosswise.

Internally, the wall below the sheath is prominently ribbed. The base is thin, but solid.

This species is so far unknown from Japanese waters.
Subgenus *Conopea* Say

22. *Balanus calceolus* Darwin, 1854


---

23. *Balanus navicula* Darwin, 1854

(Fig. 1)

*Balanus navicula* Darwin, 1854, p. 221, Pl. 3, fig. 6 a–d; Hoek, 1913, p. 223, Pl. 22, fig. 26, Pl. 23, figs. 1–3; Stubbings, 1936, p. 48.

Remarks: In the original description Darwin (1854) only states that the scutum is externally striated longitudinally. The present specimens which are confined to a particular alcyonarian Parisis fruticosa (Verrill) may be assigned to this species. If this identification is proved, it seems more likely to say that the growth-lines of the scutum are raised and strongly beaded.

Internally, the adductor ridge is obsolete, but a narrow pit for the lateral depressor muscle is distinct. The tergum is about as wide as high and strongly beaked at apex, with a widely truncated spur, about one-half of the basal margin; externally smooth and quite flat.

This species is hitherto unrecorded from Japan.

24. Balanus cf. cornutus Hoek, 1913

Balanus cornutus Hoek, 1913, p. 227, Pl. 23, figs. 12-16; Broch, 1931, p. 87, fig. 30.

Occurrence: Nomosaki. Three small specimens on Acalycigorgia inermis. 17-III-1961. (M-49)

Remarks: As discussed by Broch (1931), the presence or elimination of the narrow carino-lateral compartment seems to be a variable character and it is, moreover, a question of degree. Of three specimens before me, one lacks the carino-lateral compartment, but the other two have it. On the basis of a horn-like lateral outgrowth of the lateral compartments I am inclined to refer them to Balanus cornutus Hoek, following Broch.

Balanus cornutus Hoek is also hitherto unknown from Japanese waters.

25. Balanus cymbiformis Darwin, 1854

(Fig. 2)

Balanus cymbiformis Darwin, 1854, p. 221, Pl. 3, fig. 5 a-b; Broch, 1931, p. 85, fig. 29a-b; Nilsson-Cantell, 1938, p. 55, Pl. 2, fig. 3.
Balanus proripiens Hoek, 1913, p. 228, Pl. 23, figs. 17-21, Pl. 24, figs. 1-3; Nilsson-Cantell, 1921, p. 331, fig. 70 c-d.
Pyrgoma jedani Hoek, 1913, p. 262, Pl. 27, figs. 3-8 (after Nilsson-Cantell, 1938, p. 62).

Occurrence: Nomosaki. Two specimens on Verrucella orientalis. 2-V-1961. (M-50)

Remarks: The allied species Balanus scandens Pilsbry which has been recorded from off Osezaki, Suruga Bay (Pilsbry, 1916) and from Gotō Islands
(Nilsson-Cantell, 1921) has a broad tergum similar to that of *B. cymbiformis*, but the wall is oval in contour, something like *B. calceolus* and *B. granulatus*. In *B. cymbiformis*, however, the rostrum and carina are much elongated along the axis of the attaching gorgonarian stem, together with their basis.

Fig. 2. *Balanus (Conopea) cymbiformis* Darwin.  
*a*, Specimen, side view.  
*b*, Scutum, inner view.  
*c*, Tergum, inner view.  
*a*×about 5.  
*b*–*c*×21.


Genus *Acasta* Leach

27. *Acasta pectinipes* Pilsbry, 1912

For synonymy and description see Hiro (1937, p. 463) and Nilsson-Cantell (1938, p. 57).

**Occurrence:** Nomosaki, intertidal. Five specimens in sponges. VII-1960. (M-7)

28. *Acasta dofteini* Krüger, 1911


29. *Acasta japonica* Pilsbry, 1911

(Figs. 3-4)

*Acasta spongites japonica* Pilsbry, 1911, p. 80, Pl. 16, figs. 1-9; Hiro, 1939, p. 213.
*Acasta japonica* Pilsbry, 1916, p. 243, fig. 78; Broch, 1931, p. 96; Broch, 1947, p. 6.

**Occurrence:** Tomioka. One specimen. 1957. T. Habe coll. (T-4)

**Description:** The shell is large for the genus and glossy white with a rosy hue at the tip. Its total height is 14 mm and the carino-rostral diameter is 10 mm.

The basal cup is about one-half of the height of the carina, 5 mm in depth and broadly ovate in contour. The compartments of the wall are only loosely connected and provided with many small spines irregularly arranged. Of the compartments, the carino-lateral compartment is the narrowest and has a very narrow parietal area (only 1 mm wide), although the radii and alae are broad as in the other compartments. Internally, the sheath is dark reddish in color and transversely striated. The interior of the parietes below the sheath is slightly ribbed. The basal cup is rather shallow, with fine uneven growth-lines, but such perforation as seen in *Acasta spongites* is never indicated.

Scutum strongly concave outwards, sculptured by radial striae crossed to the growth-lines fringed with hairs. Internally, the articular ridge is rather low and the adductor ridge is prominent; Pilsbry mentions that “There is no adductor ridge” but his figure (Pl. XVI, fig. 4) apparently indicates its presence.

Tergum beaked at apex and has a concave depression from apex to spur; the low, but wide, articular ridge is continued upon the spur, which is confluent with the basi-scutal angle at its end. Internally flat; no crests for the depressor muscles.

Cirri show the following numbers of segments:

<table>
<thead>
<tr>
<th></th>
<th>I</th>
<th>II</th>
<th>III</th>
<th>IV</th>
<th>V</th>
<th>VI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anterior ramus</td>
<td>22</td>
<td>12</td>
<td>16</td>
<td>27</td>
<td>26+</td>
<td>34</td>
</tr>
<tr>
<td>Posterior ramus</td>
<td>10</td>
<td>10</td>
<td>14</td>
<td>23+</td>
<td>21</td>
<td>33</td>
</tr>
</tbody>
</table>
In cirrus I, the anterior ramus is longer than twice of the length of the posterior ramus. In cirrus II, the anterior ramus is a little longer than the posterior. In cirrus III, the rami are subequal in length. In cirrus IV, the anterior ramus has a few erect spinules on the ventro-distal face of each segment (as many as 5) and on the distal segment of the protopodite. In the remaining posterior cirri, the rami are subequal in length and their protopodite is prominently elongated.

The penis is long, annulated all over and hairy; no basi-dorsal point is present. Mouth-parts. Labrum with one or two denticles on each side of the median notch. Palp elongate, large, covered with long bristles.
Studies on the Cirripedian Fauna of Japan, VIII

Fig. 4. Acasta japonica PILSBRY.

a, Cirrus IV.  b, Labrum.  c, Palpus.
d, Mandible.  e, Maxilla I.  f, Maxilla II.

a ×127. b-f ×67.
Mandible with 4 large teeth and a truncated lower angle.

Maxilla I has 2 large upper spines followed by a row of 7 smaller spines in the upper part and 1-2 larger spines in the lower part and terminally a few spinules all along the almost straight frontal margin without any notch.

Maxilla II with a rodlike distal lobe clothed with numerous bristles.

Remarks: This species has hitherto been recorded only rarely from Japanese and Malayan waters. The type locality is Albatross Station 4936, off Kagosima Gulf in 103 fathoms. But the description of internal parts has not been given.

30. Acasta echinata HIRO, 1937

Acasta echinata HIRO, 1937a, p. 70, fig. 1; BROCH, 1947, p. 23, fig. 5; UTINOMI, 1949, p. 33, fig. 4.

Occurrence: Tomioka. Several perfect specimens imbedded in the stalk of a gigantic alcyonarian Dendronephthya (Morchellana) spinulosa. 1959. T. HABE coll. (T-5)

Nomosaki. One specimen imbedded in the stalk of the same Dendronephthya. 4-XI-1960. (M-33)

Remarks: This species was first described from Tomioka, and further recorded from Condor Island, 15-20 m in Indochina (Vietnam).

31. Acasta umitosaka n. sp.

(Fig. 5)

Occurrence: Nomosaki. About five specimens imbedded in the coenenchyme of Alcyonium gracillimum KÜKENHAL obtained by a net "Kasiami". 7-V-1961. (M-51)

Holotype: SMBL Type 188, deposited in the Seto Marine Biological Laboratory.

Description: Several galls are found on the surface of an orange-colored Alcyonium gracillimum which is common in Japanese waters. But their opening is very small and the shells are very brittle and tightly buried within the stiff coenenchyme of the host alcyonarian. Therefore, it is very difficult to remove intact specimens without injury. Thus, it is now impossible to trace the contour of the entire shell with certainty.

As far as could be detected, however, it is likely that this species may be a "window"-forming form, somewhat resembling Acasta fenestrata DARWIN, A. purpurata DARWIN and A. foraminifera BROCH.

The paries of the carina is elongated and furnished externally with two longitudinal rows of flexible chitinous hairs. The paries of the carino-lateral plate is narrower and shorter, and furnished with only one row of flexible chitinous
hairs. The radii and alae are rather broad and transversely striated. Below the radii a large “window” is formed between the carina and carino-lateral plate and the basis. The lateral and rostral plates could not be well outlined because of

Fig. 5. *Acasta umitosaka* n. sp. 
*a*, Carina (C) and carino-lateral compartment (CL), articulated, outer view. 
*b*, part of carino-lateral compartment (CL), outer view. 
*c*, Scutum, outer view. 
*d*, Scutum, inner view. 
*e*, Tergum, outer view. 
*f*, Tergum, inner view. 
*a*–*b*×21. 
*c*–*f*×27.

— 81 —
brittleness. These compartments are solid and show no internal ribs below the sheath.

The scutum is rather thick, triangular, a little longer than wide, and the growth-line are slightly beaded. Internally, there is no indication for any ridge or depression.

The tergum is narrow, with a widely truncated spur, which is about one half as wide as the basal margin. Internally, it is quite smooth and flat.

The internal body could not be examined.

Remarks: As formerly reviewed (Utinomi, 1953, 1959), we know only three species of the genus Acasta living commensally with alcyonaceans.

In general appearance, this new species is rather more related to the species living in sponges such as Acasta fenestrata, A. foraminifera, etc. than to those living in octocorals such as Acasta echinata and A. alcyonicola. The trivial name given here means the Japanese name of the host alcyonacean.

Genus Pyrgoma Leach

(INCLUDING Creusia Leach)

The opinion expressed recently by Brooks and Ross (1960) for combining together the coral-inhabiting genera Creusia and Pyrgoma of Leach seems to be generally accepted. Certainly Darwin (1854) himself suspected the validity of Creusia as a generic rank. Indeed, it is very difficult to draw any distinct line of demarcation between individuals within the same species in respect to the degree of fusion of the compartments of the wall. Moreover, the most distinct character, namely, whether or not the walls are permeated by pores, seems quite variable between individuals, as noted by Darwin.

Indeed, several species variously referred to Creusia or Pyrgoma are known which are characterized by an intermediate stage in the connection between the compartments, showing a connecting link between the typical forms of Creusia and Pyrgoma. In the material before me I find in some cases only two more or less distinct sutures between the compartments, especially between the carina and lateralia, as seen in Pyrgoma anglicum, Pyrgoma conjugatum and Pyrgoma indicum (=Creusia spinulosa forma angustiradiata). Pyrgoma oulastreae here described may also be applied to the same category.

For further detailed discussion on the classificatory problem of Creusia-Pyrgoma refer to Darwin (1854), Annandale (1924), Withers (1926, 1928, 1929), Hiro (1935, 1938), Nilsson-Cantell (1938), Brooks and Ross (1960) and Zullo (1961).

32. Pyrgoma spinulosum forma euspinulosa (Broch, 1931)

Creusia spinulosa var. (1) Darwin, 1854, p. 377, Pl. 13, fig. 6 a-d; Annandale, 1924.

Creusia spinulosa forma eu-spinulosa Broch, 1931, p. 118; Hiro, 1935, p. 49, fig. 1; Hiro, 1938, p. 393, fig. 1 a-c; Nilsson-Cantell, 1938, p. 59, textfig. 20, Pl. 2, figs. 4-5.
Studies on the Cirripedian Fauna of Japan, VIII

Occurrence: Nomosaki. Two specimens imbedded in Goniopora sp. (?). 16-XI-1960. (M-23)

33. Pyrgoma spinulosum forma secunda (Broch, 1931)

Creusia spinulosa var. (2) Darwin, 1854, p. 378, Pl. 13, fig. 6 e-g.
Creusia spinulosa forma secunda Broch, 1931, p. 118; Hiro, 1938, p. 397, fig. 5 a-e; Nilsson-Cantell, 1938, p. 60; Kolosváry, 1947, p. 425.


34. Pyrgoma spinulosum forma acuta (Hiro, 1938)

Creusia spinulosa var. (6)-2nd subvariety Darwin, 1854, p. 379, Pl. 14, fig. 6 m-o.
Creusia spinulosa forma acuta Hiro, 1938, p. 398, fig. 6 c-f.


35. Pyrgoma indicum Annandale, 1924

Creusia spinulosa var. (11) Darwin, 1854, p. 381, Pl. 14, fig. 6 U-u.
Pyrgoma indicum with phases merulinæ and symphylliae Annandale, 1924, p. 64.

Occurrence: Nomosaki. One specimen on dead stock of Favia speciosa (?). 5-I-1961 (M-41).

36. Pyrgoma cancellatum Leach, 1824

Pyrgoma cancellatum Darwin, 1854, p. 362, Pl. 12, fig. 5 a-f; Weltner, 1897, p. 255; Hiro, 1935, p. 54, fig. 5; Nilsson-Cantell, 1938, p. 67, textfig. 25, Pl. 3, figs. 2-3.

Pyrgoma cancellatum var. japonica Weltner, 1897, p. 255.


37. Pyrgoma oulastreae n. sp.

(Figs. 6-8)

Creusia spinulosa forma quarta Utinomi, 1949, p. 35, fig. 6.

Occurrence: Nomosaki, intertidal. Many specimens on Oulastrea crispata

**Holotype:** SMBL Type 187, deposited in the Seto Marine Biological Laboratory.

**Description:** Shell oval, almost depressed or low conical, grayish purple in color, with many prominent radial ridges, which are not visible externally, as they are usually overgrown thickly by spinous septa of corallites of the host coral *Oulastrea crispata* (Lamarck).

They measure in mm as follows:

<table>
<thead>
<tr>
<th>Carino-rostral diameter</th>
<th>Longest diameter of orifice</th>
</tr>
</thead>
<tbody>
<tr>
<td>Holotype</td>
<td>7</td>
</tr>
<tr>
<td>Paratype</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>10</td>
</tr>
</tbody>
</table>

![Fig. 6. Pyrgoma oulastreae n. sp.](image)

*a,* Holotype, overgrown by spinous septa of host corallite, upper view. *b,* the same, inner view. All $\times$9.

Externally, the radii and the sutures between the four compartment are apparently absent. Internally, however, a suture between the carina and lateralia is invariably distinct, while a suture between the lateralia and rostrum is either distinct or indistinct on both sides. When the suture is distinct, the inside of the narrow radius is provided with a series of interlocking denticles, about 10 in number. The sheath is glossy, finely striated transversely and its lower edge is quite free and continuous. The interior of the paries below the sheath is about one-half as high as the sheath and strongly ribbed from the base of the wall. These longitudinal ribs are all high and finely denticulate on both sides.
and at the base. The connection between the external and internal ribs of the compartments at the base of the wall is strongly denticulate. These ribs and the outer lamina are poreless.

The basis is usually only slightly embedded in the corallum and thus cup-shaped, the host coral being an encrusting form. The interior of the basal cup is quite smooth, only slightly folded radially towards the basal center. Its wall is permeated by longitudinal tubes of which the section is irregularly oval and denticulate on both sides; the outline of the section coincides with the space between the internal ribs of the compartments connected with the basis.

The scutum is wider than high and strongly convex outwards. Externally, many growth-lines run closely parallel to the basal margin. Internally, the adductor ridge is prominent and long, reaching to the basal margin. The articular ridge is low and almost straight.
The tergum is triangular. Externally, the growth-lines are coarser than those of the scutum, and a prominent, deep and broad spur-fasciole is defined. The spur is moderately short, obliquely rounded at the end, and slightly separated from the basi-scotal angle. There is no crest for the depressor muscles.

**Remarks:** This species is apparently a nearest ally of Darwin's *Creusia spinulosa* var. (4) (cf. p. 378, Pl. 14, fig. 6i-1). The tergum resembles his fig. 6i.
most closely among variable forms. According to him, the walls in specimens taken from the same coral are either porous or solid. As to the distribution, DARWIN only mentions as "Philippine Archipelago and West Indies", but none as to the host coral.

It is more doubtful whether the present species found on Oulastrea crispata which is confined to the littoral of the West-Indo-Pacific is the same as one of DARWIN's Creusia spinulosa var. (4), which was renamed by KOLOSVÁRY as forma quarta, since the tergum of the present specimens is not so considerably variable as shown in DARWIN's figures. Thus I propose that the present specimens found only on Oulastrea crispata represent an independent species of Pyrgoma in a wide sense.

This species is also found on the same coral commonly occurring in the littoral of Tanabe Bay, Kii Province, middle Japan.

Subfamily Tetraclitinae NILSSON-CANTELL

Genus Tetracita SCHUMACHER

Subgenus Tetracitella HIRO

38. Tetracita chinensis NILSSON-CANTELL, 1921

Tetracita purpurascens NILSSON-CANTELL, 1921, p. 359, textfigs. 81-82, Pl. III*, fig. 12; HIRO, 1939, p. 273, fig. 14.

Tetracita purpurascens nipponensis HIRO, 1937b, p. 469.


Occurrence: Nomosaki, intertidal. 27 specimens under stones. 3-XI-1960 (M-22). 14 specimens on the shells of Septifer virgatus. 4-XII-1960 (M-30).

39. Tetracita multicostata NILSSON-CANTELL, 1930

(Figs. 9-10)

Tetracita purpurascens var. multicostata NILSSON-CANTELL, 1930, p. 18, fig. 5.


Description: The shell is depressed, dirty white and covered with a pale purplish epidermis. The contour of the wall is oval to round, with strongly toothed basal margin. The orifice is rather quadrangular in outline, not exactly diamond-shaped.

The four compartments are provided with numerous prominent ribs radially. In the rostrum and carina, the parietes have usually three principal ribs and also 2-3 indistinct ribs are marked on both sides of the rostrum. In the lateral com-
partments, the parietes have four principal ribs, usually accompanied by a few secondary riblets near their ends. These numerous ribs and riblets extend well beyond the shell circumference, and bear chitinous hairs densely along the growth-lines. Also the radii have longitudinal growth-lines which are fringed with chitinous hairs, though shorter and sparser than those on the ribs of the parietes.

The basis is essentially membranous, but tends to be thinly calcareous.

The scutum is transversely elongated with a broad median depression on the external surface. The basal margin is almost straight and a little shorter than the occludent margin which is denticulate in the lower part, as indicated by 3-7 teeth. Internally, the adductor ridge is prominent and distinctly separated from

the high, straight articular ridge. The articular ridge is narrow but deep. The adductor muscle depression is not delimited.

The tergum is subtriangular, narrow and externally flat. The scutal margin is slightly concave, with a narrow articular furrow. The upper margin is strongly convex and the shortest of all the margins. The spur is short and obliquely rounded, occupying about one-half of the basal margin, and it is slightly separated from the basi-scutal angle. There are 4-7 crests for the insertion of the tergal depressor muscles.

The mouth-parts and cirri are not much differentiated from those of the other species in this subgenus.
Measurement of some specimens in mm.

<table>
<thead>
<tr>
<th>Carino-rostral diameter</th>
<th>11.2</th>
<th>10</th>
<th>10</th>
<th>8</th>
<th>7.4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transverse diameter</td>
<td>8</td>
<td>8.5</td>
<td>10</td>
<td>9</td>
<td>6</td>
</tr>
<tr>
<td>Diameter of orifice</td>
<td>3.8</td>
<td>4</td>
<td>3.2</td>
<td>3.2</td>
<td>2.8</td>
</tr>
<tr>
<td>Height</td>
<td>3</td>
<td>4.5</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
</tbody>
</table>

REMARKS: In general appearance the present material may be assigned to

Tetraclita purpurascens var. multicostata NILSSON-CANTELL (1930) which was ever reported from Jefbi, Misool Archipelago of Indonesia, based on one small specimen. NILSSON-CANTELL assigned it to the Australian species Tetraclita purpurascens (WOOD) and considered only as a variety of the typical species. However, comparison with the descriptions and figures of the real T. purpurascens, given by DARWIN (1854) and POPE (1945) indicates that NILSSON-CANTELL's multicostata
as well as the present material may be specifically valid. Of all the peculiarities
the ramification of the compartmental ribs seems to be the most characteristic.

40. *Tetraclita pilsbryi* n. sp.

(Figs. 11-12)

**Occurrence:** Nomosaki. Many specimens on the inside of dead shells of
*Dendostraea imbricata* (Lamarck) obtained by a net "Kasiami", probably from
10-30 fathoms. 14-IX-1960 (M-6)

**Holotype:** SMBL Type 186, together with paratypes, deposited in the Seto
Marine Biological Laboratory.

**Description:** All the specimens here examined are seated upon the smooth
inner surface of dead shells of *Dendostraea imbricata* (Lamarck), together with
many sedentary polychaetes (*Spirorbis, Hydroides*), bryozoans (*Lichenopora*) and
boring sponges (*Cliona*), and none on the imbricated outer surface.

The shell is remarkably depressed, almost round in outline and generally
dirty white, though the radial tubes within the radii are colored purplish brown,
which are visible through the transparent shell.

The four compartments are approximately of the same size and furnished
with prominent ribs, usually three in the carina and rostrum, and two in the
lateralia as in *Tetraclita costata* Darwin. These radial ribs are widely separated
from one another and extend to the basal margin and project slightly beyond the
circumference. The surface of the parietes are finely striated transversely with
delicate growth-lines, and that of the radii also striated longitudinally. Internally,
the wall of the parietes and radii is rather thin and similarly permeated by a
number of parietal tubes, which are usually hexagonal in transverse section. The
sheath is rather high and occupies approximately the upper half of the inner
lamina.

The orifice is diamond-shaped and its margin is horizontal. The basis is
entirely membranous.

The scutum is triangular, higher than wide, and externally provided with five
longitudinal row of pits crossed by the growth-lines along the slight median de­
pression. Internally, a prominent adductor ridge is present, blindly ended before
reaching to the basal margin. The articular ridge is reflexed and evenly rounded.
The adductor muscle depression is not delimited. The occludent margin is almost
straight.

The tergum is subtriangular, the carinal margin being about one-half as long
as the scutal margin. Externally it is flat and internally provided with a broad
articular furrow and 8-10 prominent crests for the insertion of depressor muscles.
The spur is short and rounded and confluent with the basi-scutal angle.

Mouth-parts. Labrum with a median notch which is much deeper than usual
in the genus; its edge is shortly hairy and there are 2 or 3 denticles on each side of the median notch.

Palpus elongate lobe-like, densely fringed with long feathered bristles all along the rounded end.

Mandible has three strong teeth, followed by three smaller teeth, each with a few spinules along the upper border. The lower angle is sharply pointed.

Maxilla I has a shallow notch on the frontal margin; two large spines above the notch and three smaller and two largest spines are planted in a series. At the lowest angle a tuft of short spines is seen.

The cirri have no characteristic feature. The posterior cirri have the rami of about 15 segments, most of which bear 3 pairs of bristles on the ventral face,
Fig. 12. *Tetraclita (Tetraclitella) pilosbryi* n. sp.

- *a*, Labrum and palpus.  
- *b*, Mandible.  
- *c*, Maxilla I.  
- *d*, Median part of cirrus.  
- *e*, Basi-dorsal point at base of penis.  
- *f*, End of penis.

*b*-e $\times 150$.  
*a*-f $\times 80$.  

--- 92 ---
The penis is long, finely annulated; a well developed basi-dorsal point or spur is present.

Measurements of Type specimens in mm.

<table>
<thead>
<tr>
<th></th>
<th>Holotype</th>
<th>Paratype 1</th>
<th>Paratype 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carino-rost. diam.</td>
<td>9</td>
<td>11.2</td>
<td>10</td>
</tr>
<tr>
<td>Transverse diam.</td>
<td>10</td>
<td>11.2</td>
<td>8</td>
</tr>
<tr>
<td>Height</td>
<td>3</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

Remarks: In external appearance, this species is closely related to *Tetraclita costata* Darwin. According to Darwin (1854, p. 340), the scutum of *T. costata* is externally striated longitudinally, and in many specimens there is a median depression or a row of very small pits. The tergum seems to be wider than that in this species. Nilsson-Cantell (1930) recorded *T. costata* from Jefbi, Misool Archipelago, but did not give detailed description on his material. This species, however, can be separated from *T. costata* by the presence of five longitudinal rows of pits in the scutum and of many crests for the depressor muscles. Further, it should be noted that this species was found in the subtidal zone, instead of intertidal, though the habitat is similarly sheltered.

41. *Tetraclita darwini* PILSBRY, 1928


Remarks: Since PILSBRY (1928) first reported from Hirado, Nagasaki Pref., this peculiar species has often been recorded from various localities of Japan, but none from elsewhere. The habitat of this species is not always under rocks, but apparently it may prefer a shaded or wetted situation like other Tetraclitellas in the intertidal zone.

REFERENCES


H. Utinomi


——— 1959. A new gall-forming barnacle imbedded in the bark of a gorgonacean colony (Acasta gregaria n. sp.). Ibid., Vol. 7, no. 3, pp. 313-318, pl. XXV.
——— 1929. The phylogeny of the cirripedes Creusia and Pyrgoma. Ibid., Ser. 10, Vol. 4, pp. 559-566, pls. X-XI.