

Galatheids and Pagurids of the Palau Islands (Crustacea : Anomura)

Keiji BABA

Synopsis

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In this paper are reported 11 species of galatheids and 26 of pagurids obtained by the Palau Islands Expedition in 1980. Distributional range of each species and its northern limit shown in Japan are summarized in table. Most of the Palauan species recorded appear to be the Indo-Malayan elements and are widely distributed in the Indo-West Pacific. Thirty-three species reach to Japanese waters. *Pagurus anceps* and *Trichopagurus trichophthalmus* are previously known from Tuamotu and Tahiti respectively. One pagurid, apparently identical with *Pylopaguropsis* cf. *magnimanus* of LEWINSOHN (1969) from the Red Sea, displays several unusual characteristics that seem at variance with the species account of *P. magnimanus* based upon the "Investigator" material.

K. BABA: Biological Laboratory, Faculty of Education, Kumamoto University, Kumamoto 860, Japan.

The anomuran Crustacea, exclusive of Porcellanidae, collected by the Palau Islands Expedition of 1980 are reported here. The stomatopods and other groups of decapods collected will be studied by respective specialists. Collections were made mostly on shore; dredging stations were also worked but restricted to a few localities inside the reefs where flat or soft bottoms permit the use of gears. Several lots of pagurids from the Palaus, collected by S. MIYAKE and now deposited in the Zoological Laboratory, Kyushu University, were examined and included here by the permission of Mr. H. MINEI of that university.

In the present paper 11 species of galatheids and 26 of pagurids are enumerated. Two species of *Diogenes* and two *Pagurus* could not be identified; these will be reported later elsewhere.

The porcellanids of Micronesia have rather extensively been studied by MIYAKE (1942, 1943). A few papers are available for galatheids (MIYAKE & BABA, 1967; BABA, 1969), but, none for pagurids. From a zoogeographical viewpoint, the occurrence of the 37 species of galatheids and pagurids in the Palaus are not unexpected. Thirty-two species of

them seem to be the Indo-Malayan elements, also highly expected to be so are three other species (*Galathea maculiabdominalis*, *Clibanarius humilis* and ? *Pylopaguropsis magnimanus*) that are known to occur outside the Malay Archipelago. *Pagurus anceps* and *Trichopagurus trichophthalmus*, both originally known from Polynesia only (FOREST, 1954), were found in the Palau.

This collecting trip was planned primarily to contribute to a better understanding of the establishment of marine invertebrate fauna of Japan, in view of the northerly dispersal of tropical elements by the Kuroshio Current. Accordingly, the distributional range from west to east in the Indo-Pacific and the northern limit displayed in Japanese waters are provided for each species to help understand the occurrence of the tropical elements in Japan (Table 1).

The northeastern boundary of the Indo-Malayan region of the shelf fauna is said to be placed in the northern part of the Ryukyu Islands (EKMAN, 1953: 16). This may be mostly true of galatheids; however, a considerable number of the Indo-Malayan pagurids intrude further north, as mentioned below:

Thirty-three of the 37 Palauan species apparently extend their range northward to Japan. Seven of the ten species of *Galathea* stop at the Ryukyus, and only two reach to Kii Peninsula; the former seven may be regarded as true corallophiles. *Galathea algae*, recorded from Tosa Bay in clinging to the seaweed at depth of 27 m (BABA, 1969: 12), is rather common on the coral reefs in the Malay Archipelago (BABA, 1977: 248; 1979: 646) as well as in the Palau. However, the established population has not been met with in the Ryukyus and the north.

Twelve species of the Palauan pagurids occur in Kii Peninsula (MIYAKE & IMAFUKU, 1980a, 1980b, 1981). All these species seem to be primarily the coral reef inhabitants and their northern limit of occurrence coincides with the availability of reef corals as shown in Kii. Six other tropical reef inhabitants stop short at the Ryukyus. The most northerly intruder recorded is *Pagurus hirtimanus* which has been known from Shiribeshi, Hokkaido (TERAO, 1913: 369). This species, however, appears to be a tropical element, and I am inclined to believe that such northern record should be retained questionable, also due to the lack of hint of identifiable key in TERAO's species account. Two species (*Aniculus aniculus* and *Clibanarius striolatus*) intrude into Toyama Bay in the Sea of Japan and one (*Trizopagurus strigatus*) into Sagami Bay in the Pacific.

Most of the species here listed are not annotated, due to little possibility of misidentification. Size is indicated by the length of carapace measured in midline, including rostrum if present. Omitted from here

Table 1. Geographic distribution of the 37 Palauan species of galatheids and pagurids

Species	Range	Northern limit displayed in Japan
<i>Galathea aegyatiaca</i>	Red Sea to Bonin Is.	Amami-oshima (MIYAKE & BABA, 1966)
<i>Galathea affinis</i>	Red Sea to Tuamotu	Amami-oshima (MIYAKE & BABA, 1966)
<i>Galathea algae</i>	Red Sea to Japan	Tosa Bay (BABA, 1969)
<i>Galathea bimaculata</i>	Malay Archipelago to Ryukyu	Amami-oshima (MIYAKE & BABA, 1966)
<i>Galathea maculiabdominalis</i>	Palau, Ryukyu	Ishigaki-jima (BABA, 1972)
<i>Galathea platycheles</i>	Malay Archipelago to Ryukyu	Amami-oshima (MIYAKE & BABA, 1966)
<i>Galathea ohshimai</i>	Malay Archipelago, Palau	—
<i>Galathea subsquamata</i>	Western Australia to Japan	Kii Peninsula (MIYAKE, 1938)
<i>Corallioagalathea humilis</i>	Red Sea to Polynesia	Miyako-jima (BABA & JAVED, 1974)
<i>Phylladiorhynchus serrirostris</i>	Malay Archipelago to Bonin Is.	Amami-oshima (MIYAKE & BABA, 1966)
<i>Allogalathea elegans</i>	Red Sea, E Africa to Fiji	Kii Peninsula (MIYAKE, 1938)
<i>Coenobita cavipes</i>	E Africa to Ryukyu	Okinawa (MIYAKE, 1965)
<i>Coenobita perlatus</i>	Seychelles to Samoa	Tokara Is. (MIYAKE, 1978)
<i>Coenobita rugosus</i>	E Africa to Tuamotu	Kii Peninsula (TERAO, 1913)
<i>Birgus latro</i>	Mauritius to Tuamotu	Okinawa (MIYAKE, 1965)
<i>Aniculus aniculus</i>	E Africa to Ellice Is.	Toyama Bay (KIKUCHI, 1932)
<i>Trizopagurus strigatus</i>	Red Sea, E Africa to Hawaii and Tahiti	Sagami Bay (MIYAKE, 1978)
<i>Dardanus deformis</i>	E Africa to Hawaii and Tuamotu	Kii Peninsula (MIYAKE & IMAFUKU, 1980 a)
<i>Dardanus guttatus</i>	E Africa to Ellice Is.	Tosa Bay (MIYAKE, 1978)
<i>Dardanus lagopodes</i>	Red Sea, E Africa to Tuamotu	Kii Peninsula (MIYAKE & IMAFUKU, 1980 a)
<i>Dardanus megistos</i>	Red Sea, E Africa to Japan	Kii Peninsula (MIYAKE & IMAFUKU, 1980 a)
<i>Dardanus scutellatus</i>	E Africa to Ellice and Fiji Is.	Kii Peninsula (TERAO, 1913: as <i>D. watasei</i>)
<i>Calcinus elegans</i>	Cocos-Keelings to Tuamotu	Kii Peninsula (SHINO, 1933)
<i>Calcinus gaimardii</i>	E Africa to Hawaii and Society Is.	Kii Peninsula (MIYAKE & IMAFUKU, 1980 a)
<i>Calcinus laevimanus</i>	E Africa to Hawaii and Tuamotu	Kii Peninsula (MIYAKE & IMAFUKU, 1980 a)
<i>Calcinus latens</i>	Red Sea, E Africa to Hawaii and Gilbert Is.	Kii Peninsula (MIYAKE & IMAFUKU, 1980 a)
<i>Calcinus minutus</i>	Vietnam to Japan	Kii Peninsula (MIYAKE & IMAFUKU, 1980 a)
<i>Calcinus pulcher</i>	Vietnam to Japan	Kii Peninsula (MIYAKE & IMAFUKU, 1980 a)
<i>Calcinus vachoni</i>	Vietnam to Ryukyu	Amami-oshima (this paper)
<i>Clibanarius eurysternus</i>	E Africa to Japan	Kii Peninsula (MIYAKE & IMAFUKU, 1980 a)
<i>Clibanarius corallinus</i>	Andaman Is. to Line Is. and Tuamotu	Tokara Is. (MIYAKE, 1956)

<i>Clibanarius humilis</i>	Mauritius to Tahiti	Okinawa (MINEI, 1973)
<i>Clibanarius striolatus</i>	Red Sea to Tahiti	Toyama Bay (KIKUCHI, 1932)
<i>Pagurus anceps</i>	Palau, Tuamatu	—
<i>Pagurus hirtimanus</i>	Red Sea to Fiji	Okinawa (MINEI, 1973)
? <i>Pylopaguropsis magni-</i> <i>manus</i>	Red Sea, Yap	—
<i>Trichopagurus tricho-</i> <i>phthalmus</i>	Yap, Palau, Tahiti	—

are the names of gastropods which hermit crabs inhabit, for the identification has not been completed in time.

I thank Mr. Hisakatsu MINEI of Kyushu University, for providing all possible cooperations in identifying the pagurids and for allowing me to include in this paper some of the specimens in the university collection under his care. I am indebted to Dr. Sadayoshi MIYAKE, Professor Emeritus of Kyushu University, for advice about the identification of pagurids.

Family Galatheaidae

1. *Galathea aegyptiaca* PAULSON, 1875

Restricted synonymy:

Galathea aegyptiaca: BABA, 1977: 244.

Material.—Reef off Kwannon; June 12, 1980: 4♂, 5 ovig. ♀. Aiyasu Reef off Arumonogui; July 10, 1980: 7♂, 4 ovig. ♀, 1♀. Gesodokkuru Reef Arumonogui; July 11, 1980: 4♂, 1 ovig. ♀, 1♀; July 12, 1980: 2 ovig. ♀. Off Inuf, Yap; lagoon; June 29, 1980: 4♂, 3 ovig. ♀.

Size.—Males, 2.3–7.1 mm; ovigerous females, 3.7–6.8 mm; nonovigerous females, 3.8 and 5.3 mm.

2. *Galathea affinis* ORTMANN, 1892

Restricted synonymy:

Galathea affinis: BABA, 1977: 247.

Material.—Reef off Kwannon; June 12, 1980: 3♂, 2 ovig. ♀, In front of Micronesia Mariculture Demonstration Center (MMDC), Malakal; June 23, 1980: 1 ovig. ♀. Aiyasu Reef off Arumonogui; July 10, 1980: 4♀, 3 ovig. ♀. Gesodokkuru Reef off Arumonogui; July 11, 1980: 2 ovig. ♀, 1♀; July 12, 1980: 6♂, 6 ovig. ♀, 1♀; July 13, 1980: 2♂, 12 ovig. ♀, 2♀. Kayangel Atoll; lagoon; July 7, 1980: 2♀. Reef off east coast of Map, Yap; July 1, 1980: 1♀.

Size.—Males, 3.2–5.9 mm; ovigerous females, 3.6–5.8 mm; nonovigerous females, 3.2–5.0 mm.

3. *Galathea algae* BABA, 1969

Restricted synonymy:

Galathea algae: BABA, 1977: 248.

Material.—Melekeiok; June 26, 1980: 1 ♀. Gesodokkuru Reef off Arumonogui; July 12, 1980: 5 ♂, 1 ovig. ♀. Off Inuf, Yap; lagoon; July 29, 1980: 2 ♂, 1 ♀.

Size.—Males, 2.5–4.9 mm; ovigerous females, 3.7 mm; nonovigerous female, 4.1 mm.

4. *Galathea bimaculata* MIYAKE & BABA, 1966

Galathea bimaculata MIYAKE & BABA, 1966: 69, fig. 10; BABA, 1979: 652.

Material.—Aiyasu Reef off Arumonogui; July 10, 1980: 1 ovig. ♀. Gesodokkuru Reef off Arumonogui; July 11, 1980: 5 ♂, 2 ovig. ♀.

Size.—Males, 2.9–5.3 mm; ovigerous females, 4.0–4.5 mm; nonovigerous females, 3.4–5.7 mm.

5. *Galathea maculiabdominalis* BABA, 1972

Galathea maculiabdominalis BABA, 1972: 86, fig. 1.

Material.—Off Kwannon; dredge; ca. 24 m; June 17, 1980: 8 ♂, 6 ovig. ♀, 1 ♀, 1 spec. (sex indeterminate).

Size.—Males, 2.6–4.2 mm; ovigerous females, 3.7–4.4 mm; nonovigerous female, 3.3 mm.

Remarks.—Coloration is nearly as described earlier (BABA, 1972: 88). Due to my careless mistake, the definition of the species is partly changed: Epipod is distinct on cheliped; this is confirmed also by reexamining the type material.

6. *Galathea ohshimai* MIYAKE & BABA, 1967

Restricted synonymy:

Galathea ohshimai: BABA, 1977: 250; –1979: 648.

Material.—In front of MMDC, Malakal; June 23, 1980: 7 ♂, 7 ovig. ♀. Aiyasu Reef off Arumonogui; July 10, 1980: 9 ♂, 7 ovig. ♀, 1 ♀. Gesodokkuru Reef off Arumonogui; July 11, 1980: 4 ♂, 3 ovig. ♀; July 12, 1980: 4 ♂, 6 ovig. ♀, 1 ♀.

Size.—Males, 2.4–4.5 mm; ovigerous females, 2.9–4.1 mm; nonovigerous females, 2.8 and 4.1 mm.

7. *Galathea platycheles* MIYAKE, 1953

Restricted synonymy:

Galathea platycheles: BABA, 1977: 246.

Material.—Aiyasu Reef off Arumonogui; July 10, 1980: 1 ♂, 3 ovig. ♀

Size.—Male, 2.6 mm; ovigerous females, 2.5–3.3 mm.

8. *Galathea subsquamata* STIMPSON, 1858.

Restricted synonymy:

Galathea subsquamata: BABA, 1977: 247.

Material.—In front of MMDC, Malakal; June 23, 1980: 2 ♂ (from

Dendronephthya sp.); 8 ♂, 5 oivg ♀ (from coral rock). Off east coast of Iwayama Bay, Koror; June 11, 1980: 3 ♂ (from coral). Off Kwannon; dredge; ca. 24 m; June 17, 1980: 4 ♂, 6 oivg. ♀, 1 ♀. Entrance of Toagel Mid in Arangel Channel; dredge, 40–50 m; June 19, 1980: 4 ♂, 7 oivg. ♀. Inside Gesodokkuru Reef off Arumonogui; dredge; 20 m; July 13, 1980: 4 ♂, 1 ♀.

9. *Coralliogalatea humilis* (NOBILI, 1905)

Restricted synonymy:

Coralliogalatea humilis: BABA & JAVED, 1974: 62, fig. 1; BABA, 1977: 250.

Material.—Reef off Kwannon; June 12, 1980: 2 ♂.

Size.—Male, 2.1 and 2.2 m.

10. *Phylladorhynchus serrirostris* (MELIN, 1939)

Restricted synonymy:

Phylladorhynchus serrirostris: BABA, 1969: 4; – 1977: 251; – 1979: 644.

Material.—Off Kwannon; dredge; ca. 24 m; June 17, 1980: 1 oivg. ♀.

Size.—Ovigerous female, 2.3 mm.

11. *Allogalatea elegans* (ADAMS & WHITE, 1848)

Restricted synonymy:

Allogalatea elegans: BABA, 1977: 252; – 1979: 654.

Material.—None.

Remarks.—One male and one female specimens from the Palau Islands (ZLKU 14129), supposed to be distinct in having epipods on P1–P3 (BABA, 1969: 6), should be merged with *A. elegans*, according to my conclusion of 1979 (BABA, 1979: 655). The biological data for the lot are: Ngadarak Reef; April 21, 1939; coll. S. MIYAKE.

Family Coenobitidae

12. *Coenobita cavipes* STIMPSON, 1858

Restricted synonymy:

Coenobita cavipes: FIZE & SERÈNE, 1955: 30, figs. 3B, 5; pl. 1: figs. 4, 6; MINEI, 1973: 55.

Material.—Urukthapel; April 30, 1939; coll. S. MIYAKE: 1 ♀.

Size.—Female, 7.7 mm.

Remarks.—This species was determined mainly by the characteristic propodus of the walking leg, as also done the following species (FIZE & SERÈNE, 1955: fig. 3).

13. *Coenobita perlatus* H. MILNE EDWARDS, 1837

Restricted synonymy:

Coenobita perlatus: ORTMANN, 1892: 319, pl. 12: fig. 25.

Coenobita perlata: FIZE & SERÈNE, 1955: 24, figs. 3C, 4; pl. 1: fig. 2.

Material.—Kayangel; July 16, 1939; coll. H. OHSHIMA & S. MIYAKE: 2 ♀.

Size.—Females, 19.3 and 23.0 mm.

14. *Coenobita rugosus* H. MILNE EDWARDS, 1837

Restricted synonymy:

Coenobita rugosus: BALL & HAIG, 1972: 89; MIYAKE, 1978: 68, fig. 25.

Material.—Melekeiok; June 25, 1980: 6♂, 7 ovig. ♀, 15♀. North-east coast of Kayangel; July 8, 1980: 3♂, 1 ovig. ♀, 1♀. East coast of Kayangel; July 7, 1980: 3♀, 6 spec. (sex indeterminate). Kayangel; July 16, 1939; coll. H. OHSHIMA & S. MIYAKE: 2♀. Urukthapel; April 30, 1939; coll. S. MIYAKE: 1♀. Ngarakeuk, Peliliou; January 20, 1938; coll. S. MURAKAMI: 1♀.

Size.—Males, 5.9–16.5 mm; ovigerous females, 8.4–11.3 mm; non-ovigerous females, 8.4–16.3 mm.

15. *Birgus latro* (LINNAEUS, 1767)

Restricted synonymy:

Birgus latro: DANA, 1852: 474; –1855; pl. 30: fig. 5.

Material.—Ngariungs, Kayangel; July 8, 1980: 1♂, 1♀.

Remarks.—Two specimens were caught at night and photographed. Unfortunately, however, they were broken almost completely during about 10 months journey from the locality to Japan.

Family Diogenidae

16. *Aniculus aniculus* (FABRICIUS, 1787)

Restricted synonymy:

Aniculus aniculus: MIYAKE, 1978: 16, fig. 6.

Material.—Melekeiok; June 26, 1980: 1♂.

Size.—Male, 28.8 mm.

17. *Trizopagurus strigatus* (HERBST, 1804)

Restricted synonymy:

Trizopagurus strigatus: BALL & HAIG, 1972: 94; MIYAKE, 1978: 18, pl. 3: fig. 5; MIYAKE & IMAFUKU, 1980a: 2; –1980b; pl. 1: fig. 2.

Material.—Short Drop Off; June 17, 1980: 1♂.

Size.—Male, 6.7 mm.

18. *Dardanus deformis* (H. MILNE EDWARDS, 1836)

Restricted synonymy:

Dardanus deformis: BALL & HAIG, 1972: 93; MIYAKE & IMAFUKU, 1980a: 6.

Material.—Melekeiok; June 25, 1980: 1♀; June 26, 1980: 1♀.

Size.—Females, 15.2 and 22.0 mm.

19. *Dardanus guttatus* (OLIVIER, 1811)

Restricted synonymy:

Pagurus guttatus: FIZE & SERÈNE, 1955: 173, figs. 26, 27C, D; pl. 5: figs. 1-3.

Dardanus guttatus: MINEI, 1973: 48, fig. 7.

Material.—Short Drop Off; June 22, 1980: 1 ♀. Melekeiok; June 25, 1980: 1 ♀. Northeast coast of Kayangel; July 8, 1980: 1 ♂, 1 ♀.

Size.—Males, 13.3 and 20.5 mm; nonovigerous females, 12.0-16.1 mm.

Remarks.—MIYAKE (1951: 134; 1978: 55) reported this species from Kii Peninsula. This was thought to be the northern limit for the species, but, later, he eliminated that record (MIYAKE & IMAFUKU, 1980a: 5), possibly because that the only one male specimen that allows reexamination for confirmation is no longer extant (MIYAKE, 1951: 134).

20. *Dardanus lagopodes* (FORSKAL, 1775)

Restricted synonymy:

Dardanus lagopodes: MIYAKE, 1978: 56, fig. 19.

Material.—Arakabesan; June 14, 1980: 3 ♀. Short Drop Off; June 17, 1980: 1 ♂. Off Kwannon; June 17, 1980: 2 ♂. Kayangel Atoll; lagoon; July 7, 1980: 1 ♀. Reef off eastern Map, Yap; July 1, 1980: 1 ♂.

Size.—Males, 3.7-31.8 mm; nonovigerous female, 16.9 mm.

21. *Dardanus megistos* (HERBST, 1804)

Restricted synonymy:

Pagurus megistos: FIZE & SERÈNE, 1955: 160, fig. 24; pl. 4: figs. 1-3.

Dardanus megistos: MIYAKE, 1960: 94, pl. 47: fig. 2.

Material.—Iwayama Bay, Koror; June 12, 1980: 1 ♀. Melekeiok; June 25, 1980: 1 ♀.

Size.—Females, 22.1 and 38.6 mm.

22. *Dardanus scutellatus* (H. MILNE EEDWARDS, 1848)

Restricted synonymy:

Pagurus scutellatus: FIZE & SERÈNE, 1955: 189, fig. 29; pl. 5: figs. 5-10.

Pagurus watasei TERAQ, 1913: 380, fig. 3.

Dardanus scutellatus: MINEI, 1913: 49, fig. 9.

Material.—Near Short Drop Off; gill net; June 22, 1980: 1 ♂. Melekeiok; June 25, 1980: 1 ♂. Ngadarak Reef; May 22, 1939; coll. S. MIYAKE: 1 ♀. Kayangel Atoll; lagoon; 4 m; July 6, 1980: 2 ♂, 1 ♀. Off Inuf, Yap; June 30, 1980: 1 ovig. ♀, 1 ♀.

Size.—Males, 7.0-10.2 mm; ovigerous female, 13.5 mm; nonovigerous females, 5.2-8.5 mm.

23. *Calcinus elegans* (H. MILNE EDWARDS, 1836)

Restricted synonymy:

Calcinus elegans: MINEI, 1973: 55, fig. 22; MIYAKE & IMAFUKU, 1980a: 5.

Material.—East coast of Kayangel; July 7, 1980: 2 ♂, 2 ovig. ♀. Northeast coast of Kayangel; July 8, 1980: 1 ♂, 3 ovig. ♀.

Size.—Males, 5.0–17.3 mm; ovigerous females, 8.9–14.5 mm; non-ovigerous female, 14.9 mm.

24. *Calcinus gaimardii* (H. MILNE EDWARDS, 1848)

Restricted synonymy:

Calcinus gaimardii: BALL & HAIG, 1972: 101; MINEI, 1973: 54, fig. 21; MIYAKE & IMAFUKU, 1980a: 5.

Material.—Gesodokkuru Reef off Arumonogui; July 13, 1980: 1♂. Northeast coast of Kayangel; July 8, 1980: 1♂. Off Inuf, Yap; July 2, 1980: 1♂, 2♀.

Size.—Males, 4.0–12.4 mm; nonovigerous females, 4.2–10.0 mm.

25. *Calcinus laevimanus* (RANDALL, 1839)

Restricted synonymy:

Calcinus laevimanus: BALL & HAIG, 1972: 100; MINEI, 1973: 52, fig. 17; MIYAKE & IMAFUKU, 1980a: 4.

Material.—Melekeiok; June 25, 1980: 4♂, 8 ovig. ♀, 4♀; June 26, 1980: 2♂. East coast of Kayangel; July 7, 1980: 7♂, 1 ovig. ♀, 1♀, Northeast coast of Kayangel; July 8, 1980: 2♀. Off Inuf, Yap; June 29, 1980: 1♀. June 30, 1980: 1♂.

Size.—Males, 2.8–11.2 mm; ovigerous females, 4.0–9.0 mm; non-ovigerous females, 3.7–8.2 mm.

26. *Calcinus latens* (RANDALL, 1839)

Restricted synonymy:

Calcinus latens: BALL & HAIG, 1972: 101; MINEI, 1973: 54, fig. 20; MIYAKE & IMAFUKU, 1980a: 5.

Material.—Short Drop Off; coral rock; June 22, 1980: 3 ovig. ♀. Northern part of Augulpelau Reef; June 13, 1980: 1♂. In front of MMDC, Malakal; coral rock; June 23, 1980: 1♀. Ngell Channel, western Auluptagel; June 11, 1980: 4♂, 1♀. Melekeiok; June 25, 1980: 2♂, 1 ovig. ♀, 1♀; June 26, 1980: 13 ♀, 11 ovig. ♀, 8♀. Aiyasu Reef off Arumonogui; July 10, 1980: 1♂. Gesodokkuru Reef off Arumonogui; July 11, 1980: 2♂; July 13, 1980: 3♂, 1♀. Kayangel Atoll; lagoon; 4 mm; July 6, 1980: 1 ovig. ♀. Off Inuf, Yap: June 29, 1980: 2♂, 2 ovig. ♀, 3♀.

Size.—Males, 2.3–9.0 mm; ovigerous females, 3.9–5.3 mm; nonovigerous females, 3.1–6.2 mm.

27. *Calcinus minutus* BUITENDIJK, 1937

Restricted synonymy:

Calcinus minutus BALL & HAIG, 1972: 102; NAKASONE, 1975: 3, fig. 2: MIYAKE & IMAFUKU, 1980a: 5.

Material.—Melekeiok; June 25, 1980: 1♂. Aiyasu Reef off Arumonogui; July 10, 1980: 2♂, 1♀. Gesodokkuru Reef off Arumonogui; July 12,

1980: 4♂, 1♀. Off Inuf, Yap; June 20, 1980: 2♂, 2♀.

28. *Calcinus pulcher* FOREST, 1958

Calcinus pulcher FORPST, 1958: 287, figs. 4, 12, 13, 16; MIYAKE & IMAFUKU, 1980a: 5; -1980b: pl. 2: fig. 3.

Material.—Kayangel Atoll; lagoon; 4 m; July 6, 1980: 1♂.

Size.—Male, 6.0 mm.

Remarks.—Spots on walking legs, orange in alcohol, remain as figured by FOREST (1958: fig. 16).

29. *Calcinus vachoni* FOREST, 1958

Calcinus vachoni FOREST, 1958: 285, figs. 2, 3, 9, 10, 15, 19.

Material.—Aiyasu Reef off Arumonogui; July 8, 1980: 1♂, 1 ovig. ♀, 1♀. Northeast coast of Kayangel; July 8, 1980: 1♂. Off Inuf, Yap; June 29, 1980: 1♂, 1 ovig. ♀. Off Colonia, Yap; July 2, 1980: 2♂, 1♀.

Size.—Males, 2.1–5.8 mm; ovigerous females, 3.7 and 3.8 mm; non-ovigerous females, 3.0 mm each.

Remarks.—All the material agree with the female specimen from the Islet of Pecheur (Rte. 1474) of FOREST which was doubtfully referred to *C. vachoni* by its different pigmentation and by the terminal part of telson torn off and lost (FOREST, 1958: 285, 286). In alcohol, dark spots on cheliped, dactylus of walking legs, ocular peduncles and penultimate segments of antennular peduncles are still distinct. Six of the 9 specimens examined have the left anterior lobe of telson without terminal spinules; two specimens are as described by FOREST; and in a male from off Inuf both the anterior lobes bear spinules.

Following specimens now deposited in the Zoological Laboratory, Kyushu University were examined through the courtesy of H. MINEI: Chinenson, China, Okinawa-jima; April 21, 1960; coll. H. MINEI: 1♂, 1 ovig. ♀, 1♀. Suno, Amami-oshima; July 30, 1967; coll. K. BABA: 1♂, 2 ovig. ♀, 1 sp.

The species account appeared in the key to Japanese species provided by MIYAKE (1978: 54) is undoubtedly based upon the former of the above-listed material; its color note clearly indicates that the present and the Ryukyu Islands specimens are identical.

30. *Clibanarius eurysternus* HILGENDOLF, 1896

Restricted synonymy:

Clibanarius eurysternus: MIYAKE, 1956: 310, figs. 4–5; MINEI, 1973: 49, fig. 10; MIYAKE & IMAFUKU, 1981: 16, 1 fig.

Material.—Melekeiok; June 25, 1980: 2♂, 1 ovig. ♀, 4♀.

Size.—Males, 12.1 and 15.3 mm; ovigerous female, 10.7 mm; non-ovigerous females, 8.3–15.5 mm.

31. *Clibanarius corallinus* (H. MILNE EDWARDS, 1848)

Restricted synonymy:

Clibanarius corallinus: BALL & HAIG, 1972: 96.

Material.—Northeast coast of Kayangel; July 8, 1980: 2♀.

Size.—Nonovigerous females, 4.7 and 12.3 mm.

32. *Clibanarius humilis* DANA, 1892

Restricted synonymy:

Clibanarius humilis DANA, 1852: 469; -1855: pl. 29: fig. 9; FOREST, 1953: 433, figs. 1, 5; MINEI, 1973: 52, fig. 16.

Material.—Melekeiok; June 25, 1980: 7♂, 4 ovig. ♀, 4♀. Northeast coast of Kayangel; July 8, 1980: 6♂, 10 ovig. ♀, 1♀.

Size.—Males, 2.3–4.8 mm; ovigerous females, 2.7–3.5 mm; nonovigerous females, 2.9–3.9 mm.

33. *Clibanarius striolatus* DANA, 1852

Restricted synonymy:

Clibanarius striolatus: MIYAKE, 1978: 51, fig. 18.

Material.—East coast of Koror; June 15, 1980: 1♂, 2♀. Arumizu Bay, Koror; June 16, 1980: 2♂.

Size.—Males, 3.4–8.0 mm; nonovigerous females, 5.7 and 6.0 mm.

Family Paguridae

34. *Pagurus anceps* (FOREST, 1954) (Fig. 1)

Eupagurus anceps FOREST, 1954: 71, figs. 15–19.

Material.—Gesodokkuru Reef off Arumonogui; July 11, 1980: 1♀. Off Inuf, Yap; June 29, 1980: 2♂, 1 ovig. ♀; June 30, 1980: 1♂.

Size.—Males, 2.0–2.5 mm; ovigerous female, 2.0 mm; nonovigerous female, 1.9 mm.

Remarks.—Reddish orange spots said to be present on various parts of carapace and appendages (FOREST, 1954: 73) remain in the preservative on walking legs of a smaller male from off Inuf. Chelae in male are much more normal in form than in the illustration of FOREST. Telson is more or less elongate, laterally bilobed feebly without distinct constriction; the terminal margin is weakly bilobed, each lobules bearing a few fine spinules.

35. *Pagurus hirtimanus* MIERS, 1880

Restricted synonymy:

Pagurus hirtimanus: LEWINSOHN, 1969: 62; MINEI, 1973: 46.

Material.—Northern part of Augulpelau Reef; June 13, 1980: 1♂. Short Drop Off; coral rock; June 22, 1980: 1♂. Gesodokkuru Reef off Arumonogui; July 13, 1980: 4♂, 6 ovig. ♀. Off Inuf, Yap; June 30, 1980: 2♀. Off Colonia, Yap; July 2, 1980: 1♀.

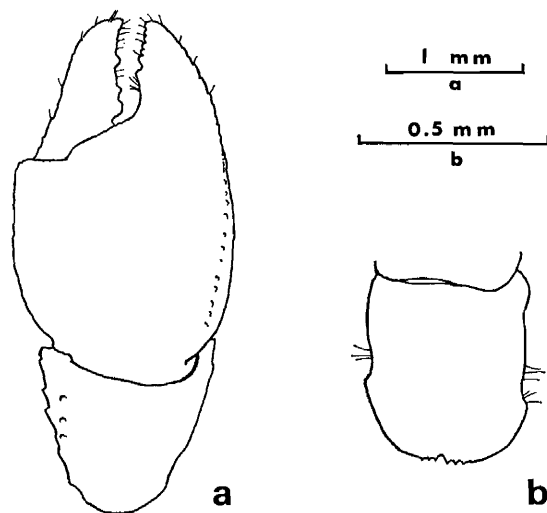


Fig. 1. *Pagurus anceps* FOREST, male from off Inuf, Yap. a, right chela; b, telson.

Size.—Males, 5.2–16.0 mm; ovigerous females, 12.0–14.3 mm; non-ovigerous females, 7.0 and 10.3 mm.

Remarks.—TERAO (1913: 369) reported this species from Kii Peninsula and Shiribeshi, Hokkaido [Ishikari Bay]. Inasmuch as this species seems to be a tropical element, TERAO's record without hint of species determination should be removed from the synonymy for the time being.

36. ? *Pylopaguropsis magnimanus* (HENDERSON, 1896) (Fig. 2)

Pylopaguropsis cf. *magnimanus*: LEWINSOHN, 1969: 58, fig. 9.

Material.—Off Inuf, Yap; June 29, 1980: 1♂.

Size.—Male, 3.9 mm.

Color in formalin.—Cephalic appendages anterior to the level of basal portion of ocular peduncle are deep red purple, as also are the distal three segments and the terminal portion of merus of walking legs. All remaining portions of the body and appendages are pale yellow.

Remarks.—The specimen is undoubtedly identical with the Red Sea material reported by LEWINSOHN (1969: 58). The following additional description is provided for the species: Two rows of cornified setae visible on ventral surface of dactyl in first walking leg of left side and in second leg of right side. Telson rather elongate, distinctly constricted laterally, posterior lobules dissimilar, left one larger; terminal margins with few spinules on inner half of left lobule, minutely spinulate medially on right lobule.

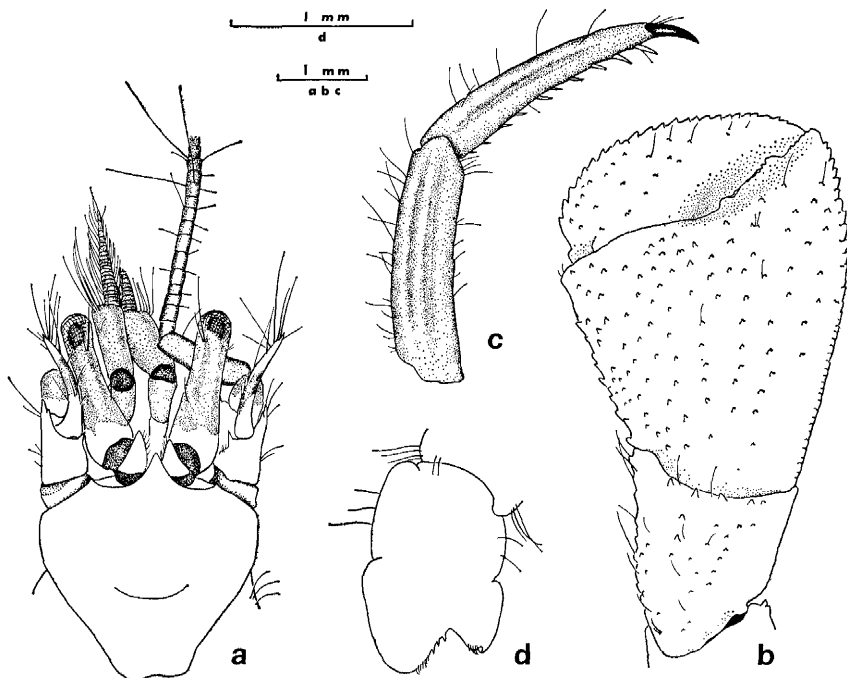


Fig. 2. ? *Pylopaguroopsis magnimanus* (HENDERSON), male from off Inuf, Yap. a, carapace shield with cephalic appendages; b, right chela; c, distal two segments of right second walking leg, dorsal view; d, telson.

Much smaller size, occurrence in shallow waters, grooved dactyl and propodus of right second walking leg, and the presence of posterior marginal spinelets on dactyl of first two pairs of walking legs, may suggest that the present as well as the Red Sea material is distinct from the true *P. magnimanus*; for details direct comparison is greatly needed.

37. *Trichopagurus trichophthalmus* (FOREST, 1954)

Catapaguroides ? *trichophthalmus* FOREST, 1954: 74, figs. 20–24.

Material.—Northeast coast of Kayangel; July 8, 1980: 1♂. Off Inuf, Yap; June 29, 1980: 1 ovig. ♀; June 30, 1980: 1♂, 1 ovig. ♀.

Size.—Males, 1.7 and 2.6 mm; ovigerous females, 2.2 and 2.7 mm.

Remarks.—When describing this species, FOREST (1954: 74) doubtfully placed it in *Catapaguroides*. Later, de Saint Laurent (1967: 929), in her work on the revision of the genus *Catapaguroides*, moved this species under the newly established genus *Trichopagurus*. This genus is monotypic; and *T. trichophthalmus* has been known only from Tahiti. This is the first subsequent record, also constituting a new locality record.

No distinct sexual dimorphism in right cheliped is noticed. Three

more or less pronounced spines are visible on the dorsoinner margin of the carpus in either sex; two inner marginal spines on the merus mentioned by FOREST (1954: 75, fig. 22) are distinct in a smaller male, but they are almost barely discernible in the remaining specimens.

摘 要

馬場敬次 (熊本大学教育学部生物学教室)——パラオ諸島産甲殻綱ガラテア類 およびヤドカリ類。

パラオ諸島産甲殻綱異尾類のうち、ガラテア類11種とヤドカリ類26種を記録した。ポリネシアとパラオからのみ知られるヤドカリの2種を除けば、パラオのガラテア・ヤドカリ類はほとんどがインド・マレー系のものである。各種のインド太平洋における分布と日本まで北上する33種の北限について略述した。

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