

THE LIBRARY  
OF THE  
INSTITUTE OF MARINE SCIENCE  
UNIVERSITY OF HAWAII

THE LIBRARY  
OF THE  
INSTITUTE OF MARINE SCIENCE  
UNIVERSITY OF HAWAII

no. 27  
c. 2

MARINE ZOOLOGY OF  
TROPICAL CENTRAL  
PACIFIC

EDMONDSON



# Marine Zoology of Tropical Central Pacific

---

## CRUSTACEA

By

CHARLES HOWARD EDMONDSON

---

### INTRODUCTION

The taxonomic section of this paper is limited to a treatment of crustaceans collected during the cruise of the "Tanager" from April 4, 1923, to August 13, 1923. It is an attempt to supplement and extend knowledge of the distribution of the crustacean fauna of the Pacific.

A few species apparently new to science are described and a considerable number of new records for the North Pacific Ocean are listed. The known crustacean fauna of the leeward Hawaiian islands, at least as far to the westward as Laysan Island, considerably exceeds that listed here. While more than 60 species were collected by the Tanager Expedition at Laysan Island alone, but ten of them are represented in the list of 25 reported from that locality by Lenz (15),<sup>1</sup> and many of the species taken by the "Albatross" in 1902 were not duplicated by the Tanager Expedition.

All but two of the thirteen species of crustaceans reported from Wake Island by Dana (7) are included in the list of more than a hundred collected in that locality by the Expedition of 1923. The naturalists of the United States Exploring Expedition, while ashore at Wake Island, apparently did not observe the large land hermit crab, *Coenobita olivera* Owen, which is one of the most abundant and conspicuous members of the land fauna of the island today. It is possible that the species may have immigrated to the island subsequently to 1841.

The shore and shallow water crustacean fauna of the leeward islands of Hawaii is, for the most part, identical with that of the larger islands of the group. The survey of the Tanager Expedition clearly shows that a number of species distributed throughout Hawaii are much more abundant about some of the outlying islands of the leeward chain. *Carpilodes super-*

<sup>1</sup>Numbers in parentheses refer to Bibliography at end of each paper.

*nodosus* Rathbun, present but not common on the reefs of Oahu and others of the larger islands, is one of the most abundant of the shallow water species about French Frigate Shoals, Lisiansky, and Laysan islands. *Phymodius laysani* Rathbun, occasionally taken on the reefs of Oahu, is apparently very common at Ocean Island and appeared at all of the leeward reefs except Lisiansky. It is also very abundant in the shallow waters about Johnston Island. Though I have but three records of *Platypodia actoeoides* (A. M. Edwards) having been taken from the reefs of the larger islands of Hawaii, it is widely distributed through the leeward chain of islands and is well represented in numbers at Laysan and Ocean islands. One specimen was also taken at Wake Island.

Johnston Island clearly represents a transitional zone between the marine forms of the South Pacific and those of Hawaii. Its crustacean fauna, however, is predominately Hawaiian, fully ninety per cent of the species taken at Johnston Island being common in the shallow waters of Hawaii.

The similarity of the crustacean fauna of Wake Island, more than two thousand miles to the westward, to that of Hawaii is not so marked as that of Johnston Island. About seventy-five per cent of the species taken at Wake Island during the Tanager Expedition have been previously recorded or observed in Hawaiian waters.

I am indebted to Dr. Mary J. Rathbun and to Dr. Waldo L. Schmitt of the United States National Museum, and to Dr. C. B. Wilson of the State Normal School, Westfield, Massachusetts, for assistance in the determination of certain species listed in this report. Included in the systematic part of this paper is the description of a new species of hermit crab by Otto Degener, the type locality of which is the island of Oahu but which also appeared in the area covered by the Tanager Expedition.

## TAXONOMY

Order DECAPODA

Suborder NATANTIA

Tribe PENEIDES

Family SERGESTIDAE

**Sergestes atlanticus** Milne Edwards.

*Sergestes frissii* Kroyer, Kgl. Danske Vid. Selsk. Skrifter, 5. Raekke, Naturv.-math. Afd. IV, 2, p. 235, Tab. 1, fig. 1, a-v, 1859.

*Sergestes atlanticus* Hansen, The Sergestidae of the Siboga Expedition, monog. 38, p. 8, 1919.

Three specimens were taken from the surface at night a few miles southwest of Wake Island. The species has a very extensive range having been reported from numerous stations in the Atlantic, Indian, and Pacific oceans. Hansen states that it is a species of the open seas and of surface waters.

**Lucifer typus** Milne Edwards.

*Lucifer typus* Hansen, The Sergestidae of the Siboga Expedition, monog. 38, p. 53, pl. 4, figs. 6a-6k, 1919.

One male specimen with long eye-stalks evidently belonging to this species, due to characteristics of the petisma and telson, was taken in the surface tow at night a few miles southwest of Wake Island. Ten female specimens also with long eye-stalks and taken at the same locality may possibly be of this species.

Hansen distinguishes between *L. typus* and his new species, *L. orientalis*, and calls attention to the unreliable reports of the distribution of *L. typus* as previously recorded by authors. He believes that, due to confusion of descriptions of species under the title *L. reynaudii*, this name should be dropped.

*L. typus* has been reported from the Atlantic Ocean and was taken by the Siboga at a few stations in the East Indian seas but according to Hansen, *L. orientalis* is much more common in the region explored by the Siboga than is *L. typus*.

A re-examination of the species which I listed from Fanning Island in 1923 (9, p. 35), under the name *L. reynaudii* Milne Edwards, leads me to believe, without doubt, that it is *L. faxonii* Borradaile.

## Family PENEIDAE

**Penaeus marginatus** Randall.

*Penaeus marginatus* Rathbun, U. S. Fish Comm. Bull., vol. 23, pt. 3, p. 902, pl. 19, fig. 2, and text fig. 55, 1906.

One specimen was taken at French Frigate Shoals. The species is very common in the shallow waters about Oahu and is nearly always to be

found in the Honolulu fish markets. The "Albatross" collected it at many stations in the Hawaiian islands.

### Tribe CARIDES

#### Family HIPPOLYTIDAE

##### **Hippolysmata paucidens** Rathbun.

*Hippolysmata paucidens* Rathbun, U. S. Fish. Comm. Bull., vol. 23, pt. 3, p. 913, pl. 24, fig. 4, 1906.

The Tanager Expedition collected from Lisiansky, French Frigate Shoals, Laysan and Johnston islands, ten specimens in all. It is very common on the reefs about Oahu.

##### **Saron marmoratus** (Olivier).

*Saron marmoratus* Kemp. Indian Mus. Rec., vol. 10, p. 84, 1914.

The species was taken at French Frigate Shoals, Johnston and Wake islands, 12 specimens in all. This species, widely distributed through the Indian and Pacific oceans, is not uncommon in the shallow waters about the larger islands of Hawaii.

##### **Thor maldivensis** Borradaile.

*Thor maldivensis* Borradaile, Linn. Soc. London Trans., vol. 17, p. 401, pl. 58, fig. 6, 1917.

Eight specimens were collected at Wake Island. Borradaile records the species from the Maldives, Minikoi, and Salomon Island in the Indian Ocean. It has also been taken on Waikiki reef, Oahu.

#### Family RHYNCHOCINETIDAE

##### **Rhynchocinetes rugulosus** Stimpson.

*Rhynchocinetes rugulosus* Rathbun, U. S. Fish Comm. Bull., vol. 23, pt. 3, p. 911, text fig. 64, 1906.

One specimen was taken at Laysan Island. The "Albatross" collected a specimen at French Frigate Shoals in about 17 fathoms. Stimpson reported the species from Port Jackson, Australia.

#### Family PONTONIIDAE

##### **Harpiliopsis depressus** (Stimpson).

*Harpilius depressus* Stimpson, Acad. Nat. Sci. Phila. Proc., p. 38, 1860.

Forty-three specimens were collected at Ocean, Laysan, Johnston and Wake islands. The species has previously been recorded from the Red Sea, the Indian Ocean, Palmyra Island, and the Hawaiian islands. It is a common species on the reefs of Oahu.

**Harpiliopsis beaupresi** (Audouin).

*Harpiliopsis beaupresi* Borradaile, Linn. Soc. London, Trans., vol. 26, no. 8, p. 379, pl. 55, fig. 21, 1917.

Two specimens were collected at French Frigate Shoals. Previous records of the species include the Red Sea and localities in the eastern section of the Indian Ocean.

**Coralliocaris tridentata** Miers.<sup>2</sup>

*Coralliocaris tridentata* Miers, Zoological Collections of H. M. S. "Alert," Crust., p. 294, pl. 32, fig. C, 1884.

Three specimens were taken at Pearl and Hermes reefs. Previous records of the species are from Thursday and Palmyra islands.

**Coralliocaris lucina** Nobili.

*Coralliocaris lucina* Nobili, Mus. Univ. Napoli. Ann. n. s., 1, no. 3, p. 5, 1901; Kemp, Indian Museum, Rec., vol. 24, pt. 2, p. 276, 1922.

Thirty-two specimens were collected at Johnston and Wake islands, the species being about equally common in the two localities. It is widely distributed in the Indian Ocean, and has previously been reported from Palmyra Island in the North Pacific Ocean.

**Coralliocaris quadridentata** Rathbun.

*Coralliocaris quadridentata* Rathbun, U. S. Fish. Comm. Bull., vol. 23, pt. 3, p. 920, pl. 24, fig. 1, text fig. 69, 1906.

Eight specimens were taken at Johnston Island. Rathbun reports one specimen taken from Auau Channel, between Maui and Molokai, at depths from 28 to 43 fathoms.

**Coralliocaris graminea** (Dana).

*Oedipus gramineus* Dana, U. S. Expl. Exped., vol. 13, Crust., p. 574, 1852; pl. 37, fig. 3, 1855.

This species is represented in the "Tanager" collections by 31 specimens, 5 taken at Johnston Island, and 26 at Wake Island. It is widely distributed through the Indian and Pacific oceans. There are records of this species in the Bishop Museum from Palmyra Island but none from Hawaii.

**Pontonia quadratophthalma** Balss.

*Pontonia quadratophthalma* Balss, Results of Dr. E. Mjoberg's Swedish Scientific Expeditions to Australia 1910-13, XXIX, Stomatopoda, Macrura, Paguridae and Galatheidea: Kungl. Svenska Vetenskapsakademiens Handlingar. Band 61, no. 10, p. 15, fig. 7, 1921.

One specimen was collected at Pearl and Hermes Reef, and one at Wake Island. The type locality is Cape Joubert, Northwest Australia.

<sup>2</sup> Renamed *C. rathbuni* by Borradaile (4, vol. 17, pt. 3, p. 385, 1917).

**Periclimenes (Falciger) spiniferus** de Man.

*Periclimenes (Falciger) spiniferus* Borradaile, Linn. Soc., London, Trans., vol. 6, no. 8, p. 369, pl. 52, fig. 1, 1917.

Twelve specimens were taken at Wake Island. Previous records are from the Indian Ocean, the East Indies, Samoa and Tahiti.

**Conchodytes meleagrinae** Peters.

*Pontonia meleagrinae* Bate, Voyage of the "Challenger," vol. 24, p. 707, pl. 124, figs. 1, 2, 1888.

*Conchodytes meleagrinae* Borradaile, Linn. Soc., London, Trans., vol. 6, p. 393, pl. 57, fig. 26, 1917.

Five specimens were taken at French Frigate Shoals, the data of four of them reading "In a live pearl shell." Borradaile says regarding the distribution of the species "Indopacific, in *Meleagrina*, and occasionally in *Tridacna*."

**Palaemonella orientalis** Dana.

*Palaemonella orientalis* Dana, U. S. Expl. Exped., vol. 13, Crust., p. 583, 1852; pl. 38, fig. 4, 1855.

An imperfect specimen, taken at Pearl and Hermes Reef, apparently belongs to this species. The species was reported by Dana from the Sulu Sea.

**Palaemonella rathbunensis** Borradaile.

*Palaemonella orientalis* Rathbun, U. S. Fish Comm. Bull., vol. 23, pt. 3, p. 925, 1906.

One specimen which agrees with this species, renamed by Borradaile (4, vol. 17, pt. 3, p. 357, 1917), was collected at Wake Island. Rathbun described the species from Hawaii.

**Palaemonella tenuipes** Dana.

*Palaemonella tenuipes* Dana, U. S. Expl. Exped., vol. 13, Crust., p. 582, 1852; pl. 38, fig. 3 a-d, 1855.

One specimen was taken at Johnston Island and 12 were taken at Wake Island. The species is known to range from the Red Sea to Japan, and has been recorded in the Pacific from the Liu Kiu islands, New Guinea, Funafuti, Palmyra and Hawaii.

## Family GNATHOPHYLLIDAE

**Gnathophyllum fasciolatum** Stimpson.

*Gnathophyllum fasciolatum* Stimpson: Acad. Nat. Sci. Phila. Proc., p. 28, 1860.

Five specimens were collected at Wake Island and one at Johnston Island. The species ranges from Mauritius through the Indian and Pacific oceans to Tahiti and northward to Hawaii. If *G. americanum* Guérin is identical with this species, as some authorities believe, its distribution would include the Gulf of Mexico and the waters about Cuba and Porto Rico.

## Family CRANGONIDAE

**Automate gardineri** Coutière.

*Automate gardineri* Coutière: Mus. Hist. Nat. Bull., vol. 8 p. 337, 1902; Fauna and Geogr. Maldive and Laccadive Archipelagoes, vol. 2, p. 854, text figs. 127, 128, 1906.

One specimen was taken at Wake Island. The species is known from Kingsmill Island in the Pacific, and from the Maldive Archipelago, Djibouti and Muscat in the Indian Ocean.

**Automate dolichognatha** de Man.

*Automate dolichognatha* de Man, Arch. für Naturgesch. vol. 53, p. 529, pl. 22, fig. 5, 1887; Lanchester, Zool. Soc. London, Proc. (2), p. 564, pl. 34, fig. 3, 1901.

Six specimens were collected at Wake Island. It has previously been reported from numerous localities in the Indian Ocean.

**Athanas djiboutensis** Coutière.

*Athanas djiboutensis* Coutière, Museum d'Hist. Nat. Bull., vol. 6, p. 233, 1897; Fauna and Geogr. Maldive and Laccadive Archipelagoes, vol. 2, p. 856, text fig. 129, 1902.

One specimen was collected at Wake Island. The species has been recorded from Djibouti, the type locality, and also from the eastern Indian Ocean. In the South Pacific it has been reported from Funafuti.

**Synalpheus paraneomeris** Coutière.

*Synalpheus paraneomeris* Coutière, Fauna and Geogr. Maldive and Laccadive Archipelagoes, vol. 2, p. 872, pl. 71, fig. 7, 1906.

Thirty-two specimens in all were collected from Pearl and Hermes Reef, French Frigate Shoals, Lisiansky, Johnston, and Wake islands. Previous records include stations in the Indian Ocean and Palmyra Island in the North Pacific.

**Synalpheus charon** (Heller).

*Alpheus charon* Heller, Sitz. Akad. Wien, Bd. 44, 1, p. 272, pl. 3, figs. 21 and 22, 1862.

Twenty-five specimens were collected at Laysan Island. Previous records are from the Indian Ocean, Hongkong, Japan, Thursday Island, and Australia.

**Synalpheus macromanus**, new species. (Fig. 1, a-j.)

Holotype, a female; length, from anterior tip of rostrum to posterior extremity of telson, 13½ mm. Type locality, Lisiansky Island. Bishop Museum collections No. 1801.

A *Synalpheus* of the *Neomeris* group with dactylus of third, fourth and fifth legs biunguiculate, the merus of third legs unarmed and the upper angle of basicerite without a spine, truncate. These characters, together with the ventral hook of the dactylus of the third leg, relates this species

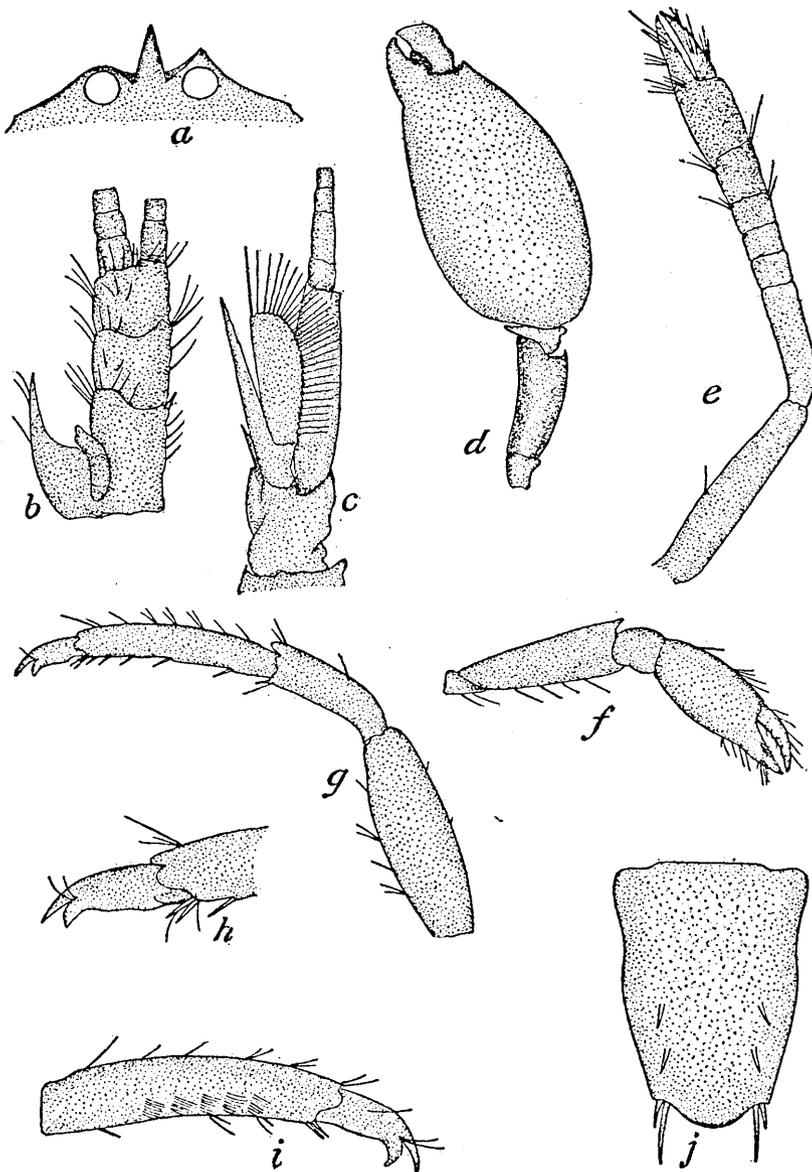


FIGURE 1. *Synalpheus macromanus*, new species: *a*, front border of carapace (border asymmetrical in holotype); *b*, basal segments of left antennule; *c*, basal segments of left antenna; *d*, left cheliped; *e*, second leg, left side; *f*, right cheliped; *g*, third leg, left side; *h*, end of third leg; *i*, terminal segments of fifth leg, right side; *j*, telson (feathered bristles of posterior border not shown).

to *Synalpheus charon* (Heller) (17) and *Synalpheus helleri* de Man (21, p. 194) from each of which, however, it differs in certain well defined features.

Rostrum triangular, sharp pointed, length  $\frac{1}{2}$  mm., width at base one-half the length, extending forward to the distal extremity of basal segment of antennule and without carina (fig. 1, a). Orbital hood drawn forward into an acute point extending half the length of the rostrum, slightly bent downward.

Antennular peduncle (fig. 1, b) with sharp, prominent stylocerite. Basicerite with lower spine reaching just beyond the distal extremity of the first segment of the antennular peduncle, upper margin truncate without a spine. Spine of scaphocerite straight on outer border, equal in length to the carpoperite and extending slightly beyond the distal extremity of the blade. Spine of scaphocerite extends a little beyond the distal extremity of the third segment of the antennular peduncle and the blade falls slightly short of the distal extremity of the same segment.

Telson similar in shape to that of *Synalpheus paraneomeris* Coutière (15, p. 872, pl. 71, fig. 7), 1 mm. long, slightly longer than broad at base; posterior border strongly convex; postero-lateral angles sharp but not spinous; two pairs of movable spines on the dorsal surface, both of which are posterior of the middle (fig. 1, j).

Left cheliped (fig. 1, d) the larger; merus twice as long as broad, triangular in cross section, upper border sharp, terminating distally in a small sharp tooth, lower distal angles more obtuse; carpus short and wide. Chela large, inflated, ovate; length of palm a little less than twice its greatest diameter, smooth and unarmed; fingers short, heavy, sharp pointed, immovable one as deep at base as long. Right cheliped (fig. 1, f) very small compared with left; merus twice as long as broad, upper border sharp, terminating distally in a sharp tooth; carpus as long as wide; palm compressed, a little longer than fingers; fingers elongate, slightly curved, sharp pointed, each with sharp cutting edge, movable one with blunt tooth at base. Tufts of setae are on the borders of right cheliped, the fingers are well covered with them.

Second leg (fig. 1, e) with first segment of carpus five times as long as the second, second and third equal, fourth slightly shorter than third, fifth a little longer than second and third combined, and stouter; fingers and palm subequal, the former covered with tufts of setae. Length of merus of third leg (fig. 1, g) three times its greatest width, smooth, unarmed, with a few tufts of setae on lower border; upper distal border of carpus terminating in a blunt process and lower distal extremity armed with a movable spine; propodus slightly shorter than merus, armed with a series of five movable spines on the lower border and a pair of them at the distal extremity, upper border with tufts of setae. Dactylus with upper hook slender, sharp, lower hook shorter, thick at the base and acutely pointed (fig. 1, h).

Fourth leg similar to third except shorter and more slender; propodus with one less spine on lower border. Fifth leg (fig. 1, i) similar to fourth in size and length with one less spine on lower border of propodus; five series of comb-like spinules arranged diagonally on the lower posterior surface of the middle third of the propodus. Lower hook of dactylus in fourth and fifth legs less acutely pointed than in third leg.

### ***Crangon collumianus* (Stimpson).**

*Alpheus collumianus* Stimpson, Acad. Nat. Sci. Phila., Proc., 1860, p. 30.

Thirty-eight specimens in all were collected at Ocean Island, Pearl and Hermes Reef, Lisiansky, Laysan, Johnston, and Wake islands. The species has a wide distribution through the Indian and Pacific oceans. It has frequently been taken on the reefs of Oahu.

**Crangon ventrosus** (Milne Edwards).

*Alpheus ventrosus* Milne Edwards, Hist. Nat. Crust., vol. 2, p. 352, 1837.

Twenty-three specimens in all were taken at French Frigate Shoals, Laysan, Johnston, and Wake islands. This species is the most common of the genus and is very generally distributed throughout the Indian and Pacific Oceans.

**Crangon paragracilis** (Coutière).

*Alpheus paragracilis* Coutière, Mus. d'Hist. Nat. Bull., vol. 3, p. 394, 1897; Fauna and Geogr. Maldive and Laccadive Archipelagoes, vol. 2, p. 883, pl. 71, fig. 22, 1906.

One hundred and forty specimens were collected by the Tanager Expedition at Pearl and Hermes Reef, French Frigate Shoals, Ocean, Laysan, Lisiansky, Johnston, and Wake islands. Its previously recognized range was from Madagascar through the Indian Ocean and included Murray Island and Tahiti in the South Pacific. It has also been taken on the reefs of the larger islands of Hawaii.

**Crangon gracilis** (Heller).

*Alpheus gracilis* Heller, SB. Akad. Wien, vol. 44, p. 271, 1862.

Fifteen specimens were collected at Lisiansky, Laysan, and Johnston islands. Previous records include the Red Sea and Djibouti in the Indian Ocean.

**Crangon insignis** (Heller).

*Alpheus insignis* Heller, Sitz. Wiss. Wien, vol. 44, p. 269, pl. 3, fig. 17-18, 1862.

Thirteen specimens in all were collected at Pearl and Hermes Reef, Lisiansky, Laysan, and Johnston islands. The species is known from the Red Sea, the Indian Ocean, the Malay Archipelago and Samoa. It has frequently been taken on the reefs of Oahu.

**Crangon paracrinitus** (Miers).

*Alpheus paracrinitus* Miers, Ann. and Mag. Nat. Hist. (5), vol. 8, p. 365, pl. 16, fig. 6, 1881.

One specimen was taken at Laysan Island and 19 at Johnston Island. At Johnston Island it was apparently one of the most common species of the genus. Previous records include Senegambia and Djibouti, Indian Ocean localities, and Palmyra Island in the North Pacific.

**Crangon paracrinitus, var. bengalensis** (Coutière).

*Alpheus paracrinitus, var. Bengalensis* Coutière, Fauna and Geogr. Maldive and Laccadive Archipelagoes, vol. 2, p. 901, 1906.

Six specimens which correspond closely to this variety were collected at Wake Island. The record of Coutière is from Minikoi. I reported a close affinity of the variety from Palmyra Island in 1923 (10).

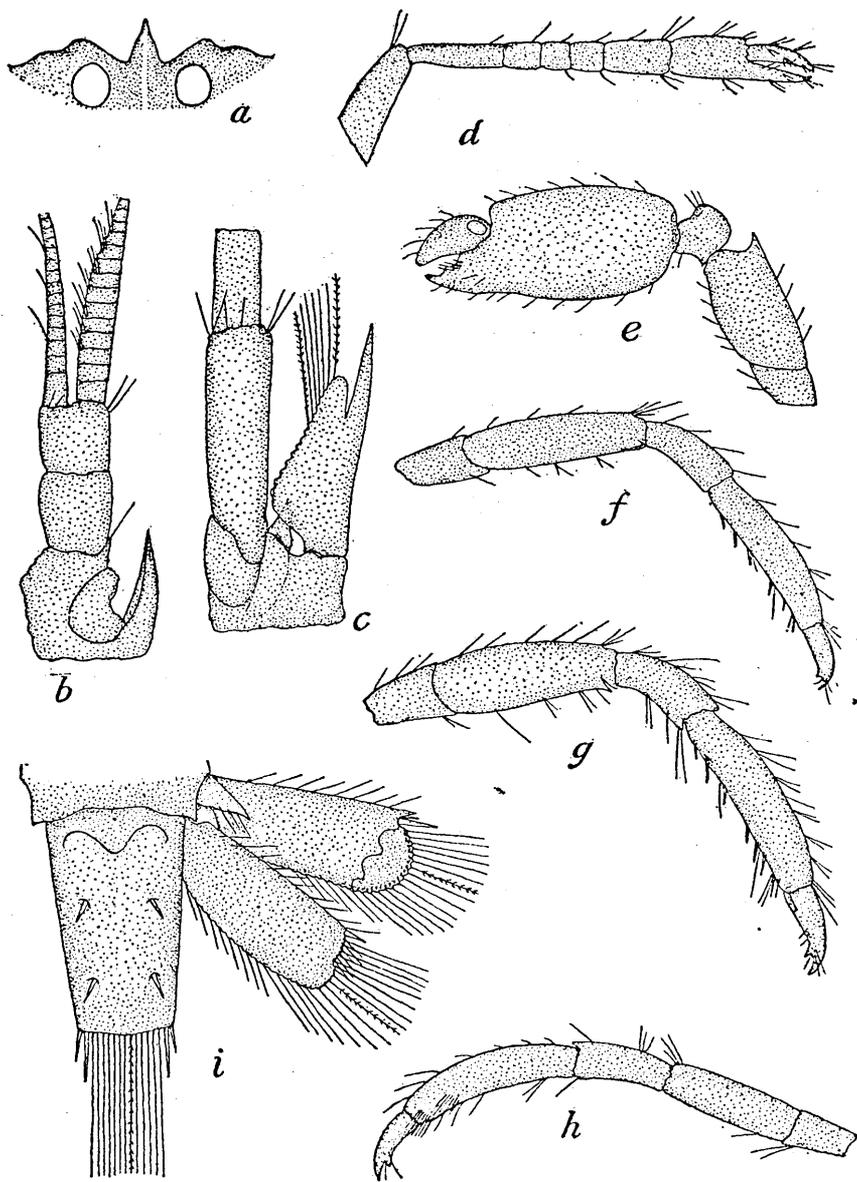


FIGURE 2. *Crangon hawaiiensis*, new species: a, front border of carapace; b, basal segments of right antennule; c, basal segments of right antenna; d, second leg, right side; e, left cheliped; f, third leg, right side; g, fourth leg, right side; h, fifth leg, left side; i, telson and right uropod.

**Crangon bucephalus** (Coutière).

*Alpheus bucephalus* Coutière, Fauna and Geogr. Maldive and Laccadive Archipelagoes, vol. 2, p. 890, pl. 78, fig. 29, 1906.

Two specimens were taken at Johnston Island and one at Laysan Island. The species has been recorded from the Indian Ocean, Ceylon, off Manila, and from Palmyra Island.

**Crangon hawaiiensis**, new species. (Fig. 2, *a-i*.)

Holotype, a female; length, from tip of rostrum to posterior extremity of telson, 12 mm. Type locality, Lisiansky Island, shallow water. Bishop Museum collections No. 1802.

Although this species is somewhat *Synalpheus*-like in appearance, the thoracic appendages bear epipods, therefore it must be considered a true *Crangon*. It apparently belongs to the *Macrochirus* group of the genus, and seems to be near *Crangon paragracilis* (Coutière) (15, p. 883, pl. 71, fig. 22), which it resembles in the rostral border and the biunguiculate character of the dactyli of the three posterior legs, but differs from that species in the large cheliped and in the merus of the third and fourth legs.

Rostrum sharp, longer than its width at the base, bearing two setae on each lateral border. Front margin of orbital hoods extending forward in blunt lobes to a level with half the length of the rostrum; upper border of rostrum rounded, separated from the orbits by shallow depressions (fig. 2, *a*).

Antennular peduncle with a sharp, prominent stylocerite which reaches just beyond the distal extremity of the first segment (fig. 2, *b*). Basicerite bearing a strong ventral spine; distal point of spine of scaphocerite on a level with the distal extremity of carpoperite, the latter extending slightly beyond the distal extremity of the antennular peduncle (fig. 2, *c*).

Telson 1.5 mm. long, posterior border nearly straight, more than three-fourths the greatest width of telson (fig. 2, *i*).

Left cheliped (fig. 2, *e*) the larger, merus three-fifths as broad as long, compressed, outer surface convex, inner surface slightly concave, upper and lower borders thin; upper border nearly straight, terminating distally in a sharp tooth, lower border more convex; carpus as broad as long; palm of chela compressed, one and a half times as long as broad, upper and lower borders rounded, smooth and free of notches and grooves but for a shallow concavity in the lower border just posterior to the base of the immovable finger; movable finger strong and blunt with a blunt tooth at its base. The borders of the cheliped, fingers and inner surface of palm provided with long setae, arranged singly and in tufts.

Second leg slender, first segment of carpus two and a half times as long as the second, third and fourth segments equal, fifth twice as long as the fourth; palm and fingers subequal in length (fig. 2, *d*). In third and fourth legs (fig. 2, *f*, *g*) ischium and merus without movable spines, but a sharp tooth is at the distal extremity of the lower border of the merus. This tooth is very small in the third leg, much stronger in the fourth leg. A few setae are on the borders of the ischium and merus. Carpus unarmed but bordered with a few long setae. Propodus almost twice as long as carpus, lower border with a series of immovable spines, there being six such spines in the third leg and seven in the fourth leg. In both legs accessory spinules or long setae accompany the movable spines. Upper border of propodus in both third and fourth legs provided with strong setae, singly and in tufts. Dactylus stout, one-third the length of the propodus, with a strong accessory tooth near the tip.

Fifth leg (fig. 2, *h*) more slender and slightly shorter than fourth; ischium, merus and carpus without spines but with a few strong setae. Propodus without

movable spines but with two rows of strong setae placed diagonally on the ventrolateral border near the distal extremity, the more distal of the two rows being the longer and having longer setae. Dactylus with a strong accessory tooth.

**Crangon clypeatus** (Coutière).

*Alpheus clypeatus* Coutière, Fauna and geogr. Maldive and Laccadive archipelagoes, vol. 2, p. 897, pls. 81 and 82, fig. 36, 1906.

Fifty specimens in all were collected at Ocean Island, Pearl and Hermes Reef, French Frigate Shoals, Johnston, and Wake islands. It is a common species in nearly all of these localities.

**Crangon pachychirus** (Stimpson).

*Alpheus pachychirus* Stimpson, Acad. Nat. Sci. Phila. Proc., p. 30, 1860.

One specimen was taken at Wake Island. Previous records are from the Maldive and Laccadive archipelagoes, Japan, the Liu Kiu islands, Murray Island, Rotuma, and Palmyra Island.

**Crangon pacificus** (Dana).

*Alpheus pacificus* Dana, U. S. Expl. Exped., vol. 13, Crust., p. 542, 1852; pl. 34, fig. 5, 1855.

Eight specimens in all were taken at Ocean, Laysan, and Wake islands. The species is widely distributed through the Indian and Pacific oceans.

**Crangon crassimanus** (Heller).

*Alpheus crassimanus* Heller, Reise der Novara, Crust., p. 107, pl. 10, fig. 2, 1865.

Fourteen specimens in all were collected at Lisiansky, Laysan, and Johnston islands. The type locality is the Nicobar Islands. It was taken at Cape York, Australia, by the Challenger Expedition, and has been collected on the reefs of Oahu.

**Crangon leviusculus** (Dana).

*Alpheus edwardsii* var. *leviusculus* Dana, U. S. Expl. Exped., vol. 13, Crust., p. 543, 1852; pl. 34, fig. 8, 1855.

Ten specimens were taken at Johnston Island and seven at Wake Island, the latter being the type locality. It was collected at Kur Island, East Indies, by the Siboga Expedition.

**Crangon gracilipes** (Stimpson).

*Alpheus gracilipes* Stimpson, Acad. Nat. Sci. Phila. Proc., p. 31, 1860.

Two specimens were collected at Lisiansky Island. The species has a wide range from Djibouti through the Indian and Pacific oceans to Tahiti and Hawaii, including New Caledonia, Australia, and Samoa in the south Pacific.

**Crangon deuteropus** (Hilgendorf).

*Alpheus deuteropus* Hilgendorf, Monatsb. K. Ak. Wiss. Berlin, p. 839, pl. 4, figs. 8-19, 1878; Coutière, Fauna and Geogr. Maldive and Laccadive Archipelagoes, vol. 2, p. 880, 1906.

Four specimens were collected at French Frigate Shoals. The species

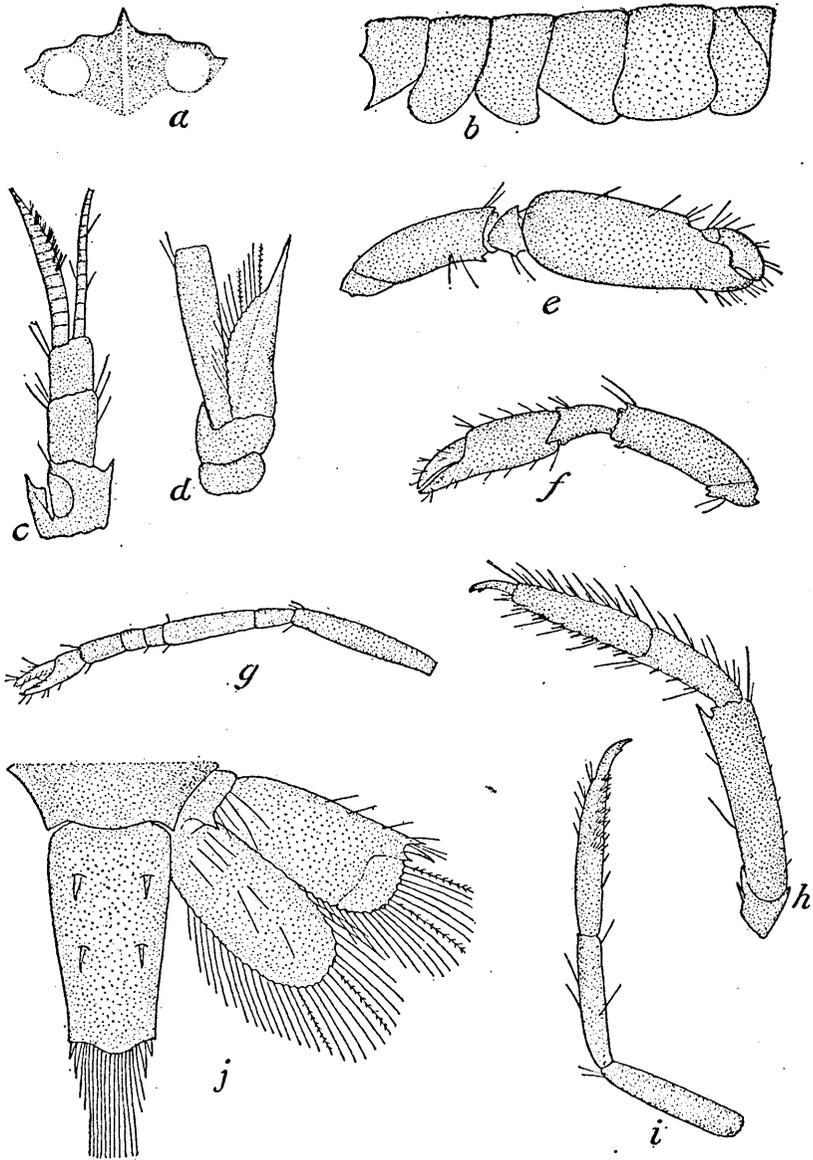


FIGURE 3. *Crangon laysani*, new species: *a*, front border of carapace; *b*, lateral view of first six abdominal segments; *c*, left antennule; *d*, basal segments of right antenna; *e*, right cheliped; *f*, left cheliped; *g*, second leg, left side; *h*, third leg, left side; *i*, fifth leg, right side; *j*, telson and right uropod.

has previously been reported from widely separated localities, including Zanzibar, Djibouti, Obok, Perim, the Maldivé Archipelago, and Tague Island.

**Crangon laysani**, new species. (Fig. 3, *a-j*.)

Holotype, a female; length, from anterior tip of rostrum to posterior margin of telson, 12 mm. Type locality, Laysan Island, shallow water. Bishop Museum collections No. 1803.

This apparently new species is clearly within the Crinitus subgroup of the Crinitus group, according to the classification of Coutière. It resembles *Crangon alcyone* (de Man) (21, p. 351) and *Crangon providencei* (Coutière) (6, p. 18) in having the dactyli of the three posterior legs biunguiculate, and in the absence of spines from the middle of the posterior margin of the sixth abdominal segment. It differs, however, from *C. alcyone* in having the posterior border of the merus of the third leg devoid of movable spines, and from *C. providencei* in a relatively longer second segment of the carpus of the second leg.

Front border of carapace (fig. 3, *a*) somewhat like *C. eulimene* (de Man) (21, p. 364) and *C. superciliaris* (Coutière) (6, a, p. 896, pl. 81, fig. 35) with a short, sharp rostrum and the frontal margin extending transversely outward from the base of the rostrum and separated by distinct emarginations from the orbital hoods. Rostrum extending anteriorly to the distal border of the first segment of the antennular peduncle, its width at the base equal to its length. A sharp rostral carina extends posteriorly beyond the border of the orbits and is separated from them by shallow depressions.

Basal segment of antennular peduncle with a short stylocerite not reaching to distal extremity of the segment, and its medial distal border terminating in a sharp spine (fig. 3, *c*).

Basicerite apparently unarmed; spine of scaphocerite extending slightly beyond the distal extremity of the carpoperite; blade of scaphocerite narrow, not quite reaching the distal extremity of the antennular peduncle, while the carpoperite extends slightly beyond it.

General shape of telson (fig. 3, *j*) like that of *C. eulimene* (21, p. 364); length 2 mm., greatest breadth 1 mm. Of the two pairs of spinules on the dorsal surface of the telson, the posterior pair is situated nearly one-half the length from the posterior border, the anterior pair being approximately one-fourth the length of the telson from the anterior border. Posterior border of telson with a pair of spines unequal in length, near each lateral angle, and fringed with about 20 feathered setae. Uropods are also fringed with feathered setae.

Right cheliped (fig. 3, *e*) in type specimen the larger. Merus twice as long as broad, sharp above and below, terminating distally in an acute tooth above and a subterminal sharp tooth below. Chela cylindrical-ovoid, smooth; length of palm 3 mm., greatest width 1.5 mm.; length of movable finger 1.5 mm., blunt with an acute tooth directed posteriorly at base. Merus of smaller cheliped nearly three times as long as wide, a blunt, subterminal point marking the upper, distal border and a strong, sharp, subterminal tooth the corresponding lower border. Carpus two-fifths as long as merus. Chela with palm slightly longer than fingers which are blade-like, sharp pointed. Palm and fingers covered by tufts of setae (fig. 3, *f*).

Second leg slender; second segment of carpus three times as long as the first, third segment as long as the fourth, fifth one and one-half times the length of the fourth; fingers longer than the palm (fig. 3, *g*).

Third (fig. 3, *h*) and fourth legs resembling those of *C. consobrinus* (de Man) (21, p. 360), except for being biunguiculate. Ischium with a strong movable spine; merus about four times as long as broad with a few short setae on upper border, and longer setae at distal extremity of this border; lower border with a few long

setae and a strong, sharp, subterminal tooth. Carpus a little more than half as long as merus, with numerous long setae on upper border, three movable spines and a few long setae on lower border; lower distal extremity terminating in a straight, sharp tooth; propodus one and one-third times as long as carpus, with tufts of strong setae on upper border, and a series of strong movable spines with smaller spinules and long setae beside them on the lower border. On the propodus of the third leg the movable spines are eight in number and on the fourth leg seven; dactylus a little more than one-fifth as long as propodus with a small but distinct accessory tooth.

Fifth leg more slender than the fourth; merus and carpus unarmed but provided with a few setae; propodus with a series of seven rows of fine setae diagonally placed on the distal half of the lower inner border; a few long setae on the upper border and six movable spines on the lower border; dactylus with a distinct accessory tooth (fig. 3, i).

### Suborder REPTANTIA

#### Tribe PALINURA

#### Family PALINURIDAE

##### *Panulirus pencillatus* (Olivier).

*Panulirus pencillatus* Bate, Voyage of the Challenger, vol. 24, p. 82, pl. 12, fig. 2, 1888.

Three specimens in all were collected, one at each of the following localities: Laysan, Johnston, and Wake islands. The species is widely distributed through the Indian and Pacific oceans.

##### *Panulirus japonicus* (von Siebold).

*Panulirus japonicus* de Haan, Fauna Japon., Crust., p. 158, pls. 41 and 42, 1841.

Two specimens were taken at Laysan Island. The typical species ranges from Japan to Hawaii, while several recognized varieties are widely distributed through the Indian Ocean.

#### Family SCYLLARIDAE

##### *Parribacus ursus major* (Herbst).

*Parribacus antarcticus* Dana, U. S. Expl. Exped., vol. 13, Crust., p. 517, 1852; pl. 32, fig. 6, 1855.

*Parribacus ursus major* de Man, Decapoda of the Siboga Expedition, pt. 3, monog. 39a,<sup>2</sup> p. 93, 1916.

Three specimens in all were taken at French Frigate Shoals, Laysan, and Johnston islands. The species which is well distributed through the Indo-Pacific region ranges from Mauritius to Tahiti and Hawaii. It also occurs in the Caribbean Sea and on the shores of Brazil.

##### *Pseudibacus pfefferi* Miers.

*Pseudibacus pfefferi* Miers, Zool. Soc. London Proc., 1882, p. 542, pl. 36, figs. 2, 3.

One specimen, which is tentatively placed under the specific name proposed by Miers, was collected on the Tanager Expedition at French Frigate Shoals. According to de Man it is the opinion of Bouvier that this form may be the natant stage of *Scyllarides squamosus* (Milne Edwards)

(13, p. 284). It has previously been reported from Mauritius and the Galapagos Islands. The type specimen from Mauritius was 32 mm. long. There is in the Bishop Museum a specimen 30 mm. long from Kaaawa, Oahu, of the same species and of about the same size as that taken by the Tanager Expedition, and another specimen 50 mm. long from Hauula, Oahu. A careful comparison of this larger specimen with the adult *Scyllarides squammosus*, which occurs in Hawaiian waters, leads one to support Bouvier in his belief. The question can only be determined, however, by a complete knowledge of the life history of *S. squammosus*.

### Tribe ANOMURA

#### Family HIPPIDAE

##### **Remipes pacificus** Dana.

*Remipes pacificus* Dana, U. S. Expl. Exped., vol. 13, Crust., p. 407, 1852; pl. 25, fig. 7 a-g, 1855.

Eight specimens in all were taken at Lisiansky Island and French Frigate Shoals. The species has a wide range, being reported from the Indian Ocean and many localities in the Pacific. It is common about the shores of Oahu.

#### Family PORCELLANIDAE

##### **Petrolisthes speciosus** (Dana).

*Porcellana speciosa* Dana, U. S. Expl. Exped., vol. 13, Crust., p. 417, 1852; pl. 26, fig. 8, 1855.

The only record of this species in the Tanager collections is from Wake Island. Thirty-five specimens were taken from that locality. The species seems to range from the Indian Ocean to Japan and eastward to the Tuamotus. There are no records from Hawaii. It has, however, been taken at Palmyra Island and is very common at Fanning Island. Rathbun has reported the species from the west African coast.

##### **Petrolisthes coccineus** (Owen).

*Porcellana coccinea* Dana, U. S. Expl. Exped., vol. 13, Crust., p. 423, 1852.

One specimen was collected at Necker Island. The type locality is the Tuamotus. Dana records the species from Maui and there are two specimens in the Bishop Museum from Oahu. It has also been reported from the Nicobar Islands.

##### **Pachycheles pisoides** (Heller).

*Porcellana pisoides* Heller, Reise der Novara, Crust., p. 73, pl. 6, fig. 3, 1865.

One specimen was taken at French Frigate Shoals. The type locality is the Nicobar Islands. It has been found to be a common species on Waikiki reef, Oahu.

## Family GALATHEIDAE

**Galathea spinosorostris** Dana.

*Galathea spinosorostris* Dana, U. S. Expl. Exped., vol. 13, Crust., p. 480, 1852; pl. 30, fig. 9 a-c, 1855.

Five specimens in all were collected at French Frigate Shoals, Pearl and Hermes Reef and Laysan Island. Dana's record is from Hawaii. It has been taken at Waikiki, Oahu, both on the reef and at depths from 30-50 fathoms outside the reef. There is a specimen in the Bishop Museum from Samoa.

**Galathea integrirostris** Dana.

*Galathea integrirostris* Dana, U. S. Expl. Exped., vol. 13, Crust., p. 482, 1852; pl. 30, fig. 12, a-b, 1855.

Two specimens were collected at Laysan Island. The species seems to be confined to the Hawaiian group. Dana's specimen was dredged at Lahaina, Maui. I do not know of other records of the species.

## Family AXIIDAE

**Axiopsis (Paraxiopsis) johnstoni**, new species. (Fig. 4, a-f; Pl. I, A.)

Holotype, a female, measuring 12 mm. from anterior tip of rostrum to posterior extremity of telson. Type locality, Johnston Island. Bishop Museum collections No. 1804.

This apparently new species is of the genus *Axiopsis* as defined by Borradaile, and possesses certain features corresponding to the subgenus *Paraxiopsis* of de Man. It seems to be near *Axiopsis (Paraxiopsis) brocki* (de Man) (20, p. 475, pl. 20, figs. 3, 3a-3d), but differs from that species in characters of the rostrum, chelipeds and telson.

Rostrum on a lower level than the gastric region of the carapace and directed slightly downward (fig. 4, a); gastric region gradually sloping anteriorly to the rostrum except in the mid-line where it is sharply deflected by reason of a short keel-like anterior prolongation of the gastric region of the carapace. Acute tip of rostrum reaching almost to the extremity of the middle segment of the antennular peduncle. Rostrum concave on upper surface, rounded below; lateral borders of rostrum marked by three teeth and tufts of hairs. From basal teeth of the lateral borders of the rostrum slight ridges curve backward on the gastric region of the carapace (fig. 4, b). The "thorns" of the antennular peduncle are very short, there being a stout tooth at the ventral, distal extremity of the third segment, and a very short, movable acicle on the upper distal extremity of the same segment (fig. 4, c). The antennular peduncle is unarmed; flagellum as long as the carapace.

Surface and lateral borders of carapace and first five abdominal segments smooth and free from hairs; sixth abdominal segment with two tufts of long setae extending backward from the posterior margin and overlying the telson. Telson a little longer than broad, sides nearly parallel, slightly broader at proximal end; each lateral border with two short teeth. Posterior border of telson convex in mid-region, toothed at lateral corners, just medial of which on either side is a pair of movable spines, the inner one being the longer; posterior border of telson fringed with long setae (fig. 4, f).

Dorsal surface of telson without spines but rendered irregular by three papillate elevations which give rise to tufts of long setae. One of the three elevations occupies the mid-line region proximal of the middle, the other two, broad and ridge-like, are about the middle of the telson one on either side of the mid-line.

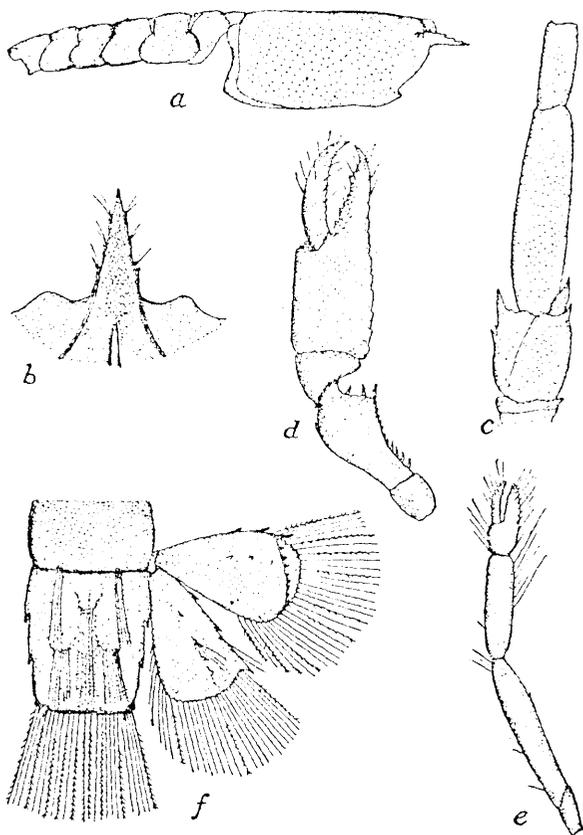


FIGURE 4. *Axiopsis (Paraxiopsis) johnstoni*, new species: a, lateral view of carapace and first six abdominal segments; b, rostrum and front border of carapace; c, basal segments of left antenna; d, right cheliped; e, second leg; f, telson and right uropod.

The front margin of both endopodite and exopodite of uropod is provided with three teeth increasing in length distally, the teeth being closer together on the margin of the exopodite. The transverse suture of the exopodite is also bordered by fine teeth, and the borders of both exopodite and endopodite are fringed with long setae some of which, on the exopodite, are of large size. Endopodite is traversed longitudinally near the mid-line by a ridge which is accentuated by tubercles giving rise to tufts of setae, and by one or two sharp spines. The uropod is slightly longer than the telson.

Length of merus of chelipeds about twice its greatest width, narrow proximally, broadened and inflated distally, inner surface flattened, outer surface convex, both smooth; upper and lower borders narrow with low, rounded crests; lower border armed

proximally with a series of four sharp teeth curving forward, becoming serrations in the middle region; lower distal border armed with strong sharp teeth, three in the right merus and two in the left. Upper border of merus with a small sub-terminal tooth near the distal extremity. A few long setae are on both upper and lower borders.

Wrist short, smooth, with a few scattered hairs on the surface. The hand of the right cheliped (fig. 4, *d*), including fingers, is slightly longer than the left, but the left is a little stouter. In each the palm is slightly longer than broad, compressed, more convex on the outer surface, smooth; upper border rounded, lower border with strong serrations which continue on the lower edge of the immovable finger, being more pronounced in the left hand. Fingers of right hand as long as upper border of palm, strongly curved, sharp pointed, crossing at tips when closed and both slightly curved inward. Movable finger with basal portion longitudinally furrowed and inconspicuous serrations along the cutting edge; immovable finger toothed at the proximal end and near the tip of the cutting edge.

Fingers of the left hand shorter than the palm and stouter than those of the right hand and more strongly curved inward. There is a low, blunt tooth proximal of the middle of the cutting edge in the movable finger, while the immovable finger has a strong bluntly-rounded tooth near the distal extremity of its cutting edge, and a much smaller one near the middle. The inner surface of the palm, and the borders and surfaces of the fingers in both chelipeds are provided with scattered tufts of hairs.

Second leg (fig. 4, *e*) with merus six times as long as broad, smooth, with a tooth on its lower border distal of the middle; propodus slightly more than half as long as merus, smooth; fingers longer than palm, broad, curved inward, cutting edges finely toothed. Third leg absent beyond the merus which is six times as long as broad, smooth and unarmed but for an inconspicuous blunt tooth at the distal extremity of the lower border. Fourth leg absent in type specimen. Fifth leg very slender, distal extremity of propodus reaching to distal extremity of merus of third leg when both are extended; propodus slightly longer than merus and twice as long as carpus; dactylus slightly curved, with three teeth, increasing in length distally, on the lower border and a small, subterminal one on the upper border. A few setae along the borders of the merus and carpus become numerous toward the upper and lower distal extremities of the propodus, on the lower border of which is also a long movable spinule. A few setae also are scattered along the borders of the dactylus.

*Coenobita oliviera* Dana, U. S. Expl. Exped., vol. 13, Crust., p. 470, 1852.

### Family COENOBITIDAE

#### *Coenobita oliviera* Owen.

The only locality included in the Tanager Expedition where this land hermit occurs is Wake Island. It is very abundant there, commonly inhabiting shells of Turbo. The Bishop Museum has 60 specimens from that island. The species is widely distributed in the Indian and South Pacific oceans. In the North Pacific it has been recorded from Guam, Marcus, Palmyra, and Fanning islands. It does not occur in Hawaii.

#### *Coenobita rugosa* (Milne Edwards).

*Coenobita rugosa* Dana, U. S. Expl. Exped., vol. 13, Crust., p. 471, 1852; pl. 30, fig. 1, 1855.

Ten specimens were collected at Wake Island, the only locality covered by the Tanager Expedition where the species occurs. It is a widely dis-

tributed species in the Indian and South Pacific oceans. Previous records from the North Pacific include the Bonin Islands, Guam, Palmyra, and Fanning islands. It inhabits the shells of many species of mollusks and may be found on the ocean beaches just above high tide line. There are no records from Hawaii and Dana did not report it from Wake Island in 1841.

#### Family PAGURIDAE

##### **Clibinarius corallinus** (Milne Edwards).

*Clibanarius corallinus* Alcock, Cat. Indian Decapod Crust., pt. 2, fasc. 1, p. 48, pl. 5, 1905.

The species was collected by the Tanager Expedition at Wake Island only, where 39 specimens were taken. It is very common in that locality. The previously known range extended through the eastern Indian Ocean, the Malay Archipelago, and eastward through the Pacific to Tahiti and northward to Fanning Island. It has not been recorded from Hawaii.

##### **Calcinus herbstii** de Man.

*Calcinus herbstii* Alcock, Cat. Indian Decapod Crust., pt. 2, fasc. 1, p. 53, pl. 5, fig. 4, 1905.

On the Tanager Expedition 10 specimens were taken at Nihoa, 57 at Johnston Island, and 12 at Wake Island. The species ranges through the warmer waters of the Pacific and Indian oceans. Is also reported from the West Indies and Ecuador. It is very common on the reefs of Oahu but was not taken by the Expedition about any of the low, leeward islands of the Hawaiian chain.

##### **Calcinus elegans** (Milne Edwards).

*Calcinus elegans* Alcock, Cat. Indian Decapod Crust., pt. 2, fasc. 1, p. 55, pl. 5, fig. 2, 1905.

Twenty specimens in all were collected at French Frigate Shoals, Necker, Johnston and Wake islands. The species is widely distributed through the Indian and Pacific oceans.

##### **Calcinus latens** Randall.

*Calcinus latens* Alcock, Cat. Indian Decapod Crust., pt. 2, fasc. 1, p. 58, pl. 5, fig. 5, 1905.

On the Tanager Expedition survey 132 specimens in all were collected at French Frigate Shoals, Pearl and Hermes Reef, Ocean, Johnston, and Wake islands. Of this number 114 were taken at Johnston Island where the species was apparently the most common of the hermit crabs of the shore waters. The species has a wide range through the Indian and Pacific oceans. It is common about Oahu, and there are records of the species from Laysan Island.

**Aniculus aniculus** Fabricius.

*Aniculus aniculus* Alcock, Cat. Indian Decapod Crust., pt. 2, fasc. 1, p. 94, pl. 7, fig. 6, 1905.

*Aniculus typicus* Dana, U. S. Expl. Exped., vol. 13, Crust., p. 461, 1852; pl. 29, fig. 1, 1855.

Forty-one specimens in all were collected by the Tanager Expedition at Johnston and Wake islands, the species being common in both localities. It ranges through the Indian Ocean and the Pacific as far eastward as the Tuamotus. There are no records from Hawaii. Dana reported the species from Wake Island as *Aniculus typicus*.

**Aniculus strigatus** Herbst.

*Aniculus strigatus* Alcock, Cat. Indian Decapod Crust., pt. 2, fasc. 1, p. 97, pl. 7, fig. 4, 1905.

One specimen was collected at French Frigate Shoals. The species is distributed through the Indian Ocean and is known from the Loyalty Islands and Tahiti in the South Pacific, and ranges northward to Hawaii.

**Dardanus punctulatus** (Olivier).

*Pagurus punctulatus* Alcock, Cat. Indian Decapod Crust., pt. 2, fasc. 1, p. 81, pl. 8, fig. 1, 1905.

Two specimens were collected at Johnston Island. The species ranges through the Indian Ocean and the Pacific as far northward as Hawaii.

**Dardanus asper** (de Haan).

*Pagurus asper* Alcock, Cat. Indian Decapod Crust., pt. 2, fasc. 1, p. 90, pl. 9, fig. 5, 1905.

Nine specimens were taken by the Tanager Expedition, two of which were collected at French Frigate Shoals, one at Wake Island and six at Laysan Island. The species ranges from the eastern section of the Indian Ocean to Japan, Australia, and Hawaii.

**Dardanus deformis** (Milne Edwards).

*Pagurus deformis* Alcock, Cat. Indian Decapod Crust., pt. 2, fasc. 1, p. 88, pl. 9, fig. 4, 1905.

One specimen was collected at Wake Island. The species is distributed through the Indian and Pacific oceans to Tahiti and northward to Hawaii. Numerous specimens have been taken on the reefs of Oahu.

**Dardanus sanguinocarpus**, new species (9). (Pl. II, A; fig. 5, a, b.)

Type specimen, total length 32 mm.; length of carapace 19 mm.; type locality, Oahu, on the reef. Bishop Museum collections No. 1813.

Carapace somewhat convex longitudinally and transversely, with tufts of yellowish bristles on and near the anterior and antero-lateral borders, as well as scattered scantily over the dorsal surface. Width of the crustate part about four-sevenths the length of the entire carapace in the middle line (Pl. II, A).

Eyestalks slightly depressed and inflated distally; a little shorter than the anterior border of the carapace, but exceeding the antennular peduncle in length

by 2 mm. and the antennal peduncle by 3 mm. Ophthalmic scales notched on the anterior border, spinulose and setose. Antennal acicle just overlapping the base

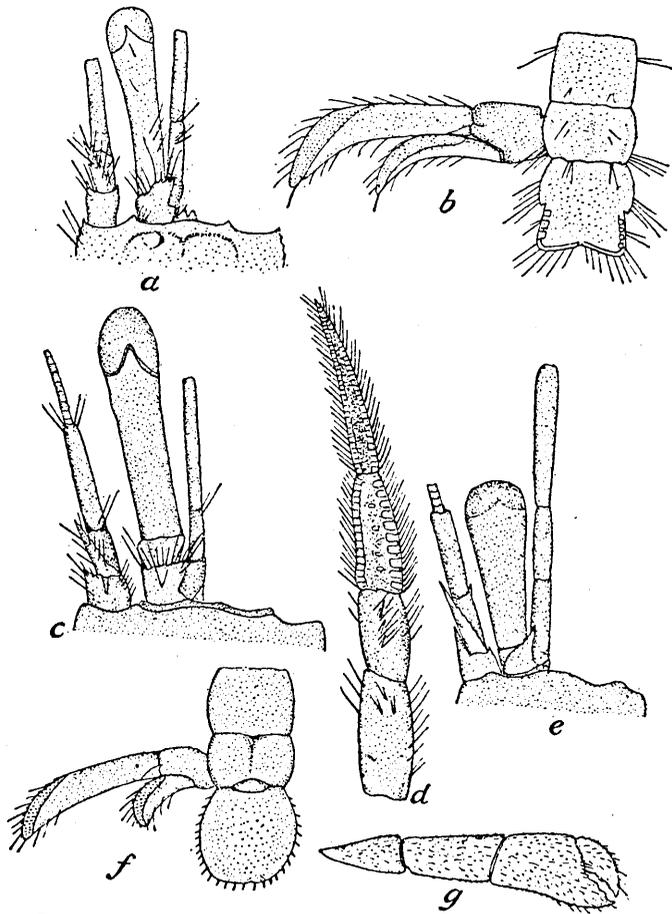


FIGURE 5. *Dardanus sanguinocarpus* (a-b), *Dardanus sulcatus* (c-d), and *Sympagurus pacificus* (e-g), new species: a, anterior border of carapace, eye-stalk and peduncles of antenna and antennule; b, terminal segments of abdomen with left uropod (right uropod which is smaller than left is not shown); c, anterior border of carapace, eye-stalk and peduncles of antenna and antennule; d, third leg on left side; e, anterior border of carapace, eye-stalk and peduncles of antenna and antennule; f, terminal segments of abdomen with left uropod (right uropod which is smaller than left is not shown, telson is slightly asymmetrical in type specimen); g, right cheliped.

of the terminal segment of the antennal peduncle, spinose and strongly setose (fig. 5, a).

Left cheliped longer and much stouter than right. Merus a little longer than wide on outer face, as wide as long on inner surface. Lower outer and inner margins spinose, the inner more strongly so; narrow upper border and outer surface roughened by squamiform folds the anterior border of each being spinulose and setose. Upper distal margin of the outer surface of merus strongly toothed. Carpus

short and stout; upper and outer surfaces armed with spines, those toward the upper border very strong with black tips, curving forward. A few yellowish bristles arise from the base of the spines.

Palm of chela wider than long, upper border and outer surface armed with erect, black tipped spines that tend to be arranged in longitudinal rows. Long reddish bristles, some with white tips, arise from the base of the spines. Lower border of palm and basal portion of immovable finger flaring outward in a very conspicuous manner. Fingers spinose and setose; cutting edges with a few bluntly rounded teeth. Inner surface of cheliped smoother than outer; tufts of bristles few on merus and carpus, becoming more numerous on palm and fingers. Lower inner surface of palm spinulose.

Right cheliped less strongly armed than the left. Upper border of palm strongly spinose, lower two-thirds of outer surface almost free from spines. Long bristles, similar to those of the left cheliped, increase in density from the merus to the fingers.

Second pair of legs shorter than the third. The second and third legs of the right side differ little from one another. Lower border of merus with a few spinules; upper border of carpus near the distal extremity armed with two strong spines; upper border of propodus and dactylus spinulose and densely covered with tufts of long bristles. The posterior face of merus, carpus and propodus is quite free from spines; especially is the upper posterior surface of the carpus smooth and polished. Bristles similar to those of the chelipeds fringe the borders of the segments and become more numerous on the propodus and dactylus.

The third leg on the left side differs from the second with respect to the propodus and dactylus. In the third leg these two segments are nearly twice as wide as those of the second leg, and both segments are deeply grooved longitudinally on the posterior surface. Sharp spines border this groove on either side. Otherwise the legs of the left side are armed with spines and bristles similar to those of the right side.

The general ground color of the type specimen is a warm gray with numerous whitish spots that tend to run together on the anterior part of the carapace. On the anterior, mid-dorsal surface of the carapace is an area purplish-slate in color, appearing almost black. This area is somewhat deltoid in shape extending laterally a little beyond the bases of the eyestalks. On either side of this dark area and a little posteriorly is a bright red area. Behind these areas the carapace becomes purple merging posteriorly into the ground color of the animal. The softer parts of the carapace and the abdomen are marked by broken, irregular lines of dark red. Eyestalks purplish-yellow, almost clear yellow just behind the cornea. Antenna and antennules yellow. Upper half of carpus of chelipeds marked by a bright red area unevenly surrounded by purple. The spines of both the purple and red areas are purple in color. To a lesser extent the merus of each cheliped is marked in a manner similar to that of the carpus. The polished area of the posterior surface of the carpus of the second and third legs is purplish-slate in color like that of the deltoid area of the carapace.

The species bears some relationship to *D. setifer* (Milne Edwards) (1, p. 83, fig. 3), in that the eyestalks are longer than the antennular peduncles, but differs from it in the characters of the chelipeds and the third left leg. It seems to differ from *D. sanguinolentus* (Quoy and Gaimard) (14, p. 532, pl. 79, fig. 2) in the proportionate length and character of the chelipeds, in the form of the third leg on the left side and in coloration.

The type specimen, inhabiting a shell of *Turbo intercostalis* Menke, was taken in shallow water near Diamond Head, Oahu, in April, 1923. A second specimen, also an ovigerous female, was collected in the same locality the following month. It is deposited in the United States National Museum. Another specimen is recorded from Waikiki reef, Honolulu, and several immature specimens were collected

near Haleiwa, Oahu, inhabiting shells of a common species of *Cypraea*. One specimen was collected during the Tanager Expedition at French Frigate Shoals.

**Dardanus sulcatus**, new species. (Pl. II, B; fig. 5, c, d.)

Holotype an ovigerous female; length of carapace 12 mm., greatest breadth across branchial region 10 mm. Type locality French Frigate Shoals. Bishop Museum collections No. 1815.

This species is apparently closely related to *D. setifer* (Milne Edwards) (1, p. 83, pl. 8, fig. 3), but differs from it primarily in the character of the surface of the chelipeds and in the proportionate size of the segments of the third leg of the left side.

Carapace depressed, almost flat, with tufts of yellow bristles on the antero-lateral borders, the front margin and the dorsal surface (Pl. II, B). Eyestalks longer than the width of the anterior border of the carapace, a little depressed distally with the ocular portion but slightly expanded. They exceed the antennular peduncles in length by 2 mm. and the antennal peduncles by nearly 3 mm. Front border of ophthalmic scales nearly straight with a few minute spines and strongly setose. Acicle of antennal peduncle short, spine-like, reaching but slightly beyond the base of the terminal segment and densely covered with long bristles (fig. 5, c); flagellum of antenna longer than carapace.

Chelipeds similar in form, the left slightly longer and larger than the right. Merus of left cheliped twice as long as broad, lower border with a few small spines increasing in size toward the distal extremity; outer surface roughened by more or less conspicuous wrinkles, vertically arranged, and thickly covered with long yellow and red bristles, the yellow ones more numerous. There are a few spinules on the anterior margin of the outer surface of the merus and also on the distal border of the more prominent wrinkles. Wrist as broad as long; outer surface and upper and lower borders covered with numerous bristles among which are a few short spines. Hand with palm as broad as long; entire outer surface, upper and lower borders, together with fingers, densely covered with tufts of long yellow and red bristles which more or less conceal short spines. A row of stronger spines marks the upper margin of the palm. Fingers slightly shorter than upper border of palm, cutting edges with low blunt teeth. Cheliped comparatively smooth on inner surface; segments with a few tufts of bristles becoming more numerous on the fingers. The right cheliped resembles the left in form and character of surface but differs from it in being somewhat smaller.

Second and third legs on the right side longer than those on the left side. All are covered with tufts of yellow and red bristles becoming more dense on the terminal segments. Numerous spinules are interspersed among the bristles. The outer surface of the propodus and dactylus of the third leg on the left side resembles *D. setifer* (Milne Edwards) in ornamentation but the segments are proportionately longer in my species, the propodus being a little more than twice as long as broad. In *D. setifer* the breadth of the propodus is three-fifths its length. In the third leg on the left side in my species a shallow longitudinal groove traverses the upper border of the carpus near its posterior margin, and the posterior surface of the propodus and dactylus is marked by a deep, broad furrow extending their entire length. Transverse grooves divide the furrowed surface of these segments into a series of scutes of almost uniform size, the distal border of each having a fringe of very short, fine setae. On the upper and lower borders of the propodus and dactylus is a dense fringe of long bristles in addition to those arranged in tufts on the general surface of the leg (fig. 5, d).

After having been in alcohol for more than a year the color of the carapace and abdomen is very pale yellow, almost white; eyestalks, antennae, antennules,

and legs are light yellowish-brown becoming slightly deeper in color toward the extremities of the appendages; bristles yellow and red; corneas of eyes, tips of chelae and claws black.

**Sympagurus pacificus**, new species. (Pl. II, C; fig. 5, e-g.)

Holotype having a total length of 13 mm.; length of carapace 5 mm.; width of front border of carapace 2 mm. Type locality, off Laysan Island at a depth of 200 fathoms. Bishop Museum collections No. 1816.

A form resembling *Parapagurus* in general appearance but by reason of the character of the gills is placed under the genus *Sympagurus*.

Carapace with parallel sides, strongly convex transversely, smooth, without spines or hairs (Pl. II, C). Eyestalks stout, somewhat expanded distally, slightly shorter than the width of the front border of the carapace. They slightly exceed the antennal peduncle in length and extend little beyond the base of the terminal segment of the antennular peduncle. Ophthalmic scales terminating antero-medially in a sharp spine. Antennal acicle spine-like, reaching distally of the middle of the eyestalks, with the medial border spinulose and supporting a few fine hairs (fig. 5, e).

Right cheliped (fig. 5, f) much longer and stouter than the left. Merus narrow proximally becoming broader distally, a little longer than greatest breadth; inner surface flattened, smooth; lateral surface convex, slightly roughened by smooth, rounded granules of microscopic size. The lower border is weakly serrate. Carpus longer and stouter than merus with the medial surface less flattened. Surface more conspicuously granulate than that of merus, some of the granules becoming sharp on the upper distal border. Hand, including fingers, as long as the carpus but stouter. Palm increasing in breadth distally, medial and lateral surfaces convex; upper border rounded, lower border, including immovable finger, sharp and serrated. Fingers stout, as long as upper border of palm, slightly curving medially. Surface of palm, together with fingers, covered with smooth, rounded granules of larger size than those of carpus. On the upper border of the palm the granules, or minute tubercles, are more densely crowded extending on the dorsal border of the movable finger as a granulate crest. Very short, yellowish hairs are interspersed among the granules on the segments of the cheliped.

Left cheliped slender, reaching slightly beyond the distal extremity of the carpus of the right cheliped, general surface smooth. Carpus longer and stouter than merus; upper and lower borders of both segments with a fringe of long fine hairs, more numerous and longer on the upper border. Upper and lateral distal borders of carpus each with a sharp spine. Hand, including fingers, equal in length to carpus palm slightly longer than broad and about equal in length to the slender fingers. Tufts of long fine hairs border the palm and cover the fingers.

Second and third legs quite similar, all slightly reaching beyond the distal extremity of the right cheliped when drawn forward. Third leg on either side slightly longer than second; length of merus a little more than three times its greatest breadth, longer than the carpus and a little shorter than the propodus. Dactylus about equal to carpus and propodus together. Upper border of merus, carpus and propodus with a few short, movable spinules. A short immovable spine terminates the upper distal extremity of the carpus. In the third leg on either side, the merus and carpus are slightly broader and stouter than the corresponding segments of the second leg, and the dactylus is a little longer and more strongly curved.

The Tanager form differs from *S. arcuatus* (12, p. 67, pl. 5, figs. 21-28) and *S. bicristatus* (12, p. 154, pl. 11, figs. 11, 12), Atlantic species of Edwards and Bouvier, and the Indian Ocean varieties of these species as

var. *monstrosus* (1, p. 105, pl. 10, fig. 5) and var. *indicus* (1, p. 105, pl. 10, fig. 4) as defined by Alcock, in the absence of a crest on the upper border of the right palm and in other features of both chelipeds. It differs from *S. pictus* Smith (25) and *S. pilimanus* (A. M. Edwards) (12, p. 63, pl. 5, figs. 8-20) in the less strongly pubescent character of the chelipeds and in the armature of those appendages. From the Atlantic species and the Indian Ocean varieties it seems to differ also in the proportionate length of eyestalks and peduncles of antennules and antennae. In the Tanager species the eyestalks reach beyond the distal extremity of the second segment of the peduncle of the antennule and considerably beyond the peduncle of the antenna.

**Pagurus zebra** (Henderson).

*Eupagurus zebra* Henderson, Linn. Soc., Zoology Trans., vol. 5, p. 425, pl. 39, figs. 12-15, 1893; Alcock, Cat. Indian Decapod Crust., pt. 2, fasc. 1, Pagurides, p. 126, pl. 11, fig. 5, 1905.

Two specimens which were taken on the Tanager Expedition at French Frigate Shoals are consigned to this species. They agree with Henderson's description of the type specimen in the chief characteristics but differ from the established species in certain minor features perhaps of varietal value. In the specimens from French Frigate Shoals the antennular peduncle is comparatively shorter than indicated by Henderson's description and figures, being subequal in length to that of the antenna instead of considerably longer. In the Tanager specimens the left cheliped reaches beyond the base of the dactylus of the right cheliped instead of falling short of it as Alcock states regarding the specimens collected by the "Investigator."

After being in alcohol for more than a year the original color of the specimens from French Frigate Shoals has probably faded to some extent. A crimson color faintly indicated on the distal portion of the merus of the walking legs and the left cheliped grows deeper on the following segments and becomes fainter again at the tips of the appendages. Longitudinal stripes of a deeper red color are indicated on these same appendages. The eye-stalks and peduncles of antennae and antennules are faintly crimson toward their distal extremities, while the flagellum of the antenna is deep red in color especially toward the distal two-thirds of its length. The right cheliped is colorless.

Both specimens collected at French Frigate Shoals are females, one being ovigerous. They are approximately equal in size, about 12 mm. long, with the right cheliped 8 mm. long.

The species has been taken from off the northwest coast of Australia in 53 fathoms, which is the type locality; off the coast of Ceylon in 28 fathoms; from the Andamans, and from the Persian Gulf in 49 fathoms.

## Tribe BRACHYURA

## Subtribe DROMIACEA

## Family DYNOMENIDAE

***Dynomene hispida* Desmarest.**

*Dynomene hispida* Desmarest, Consid. sur les Crust., p. 133, pl. 18, fig. 2, 1825.

One specimen was collected at Ocean Island and four at Johnston Island. The range of this species includes Mauritius and other localities in the Indian Ocean, and the most leeward island of the Hawaiian chain. I have taken it on the reefs of Oahu.

## Subtribe OXYSTOMATA

## Family LEUCOSIIDAE

***Nucia speciosa* Dana.**

*Nucia speciosa* Dana, U. S. Expl. Exped., vol. 13, Crust., p. 397, 1852; pl. 25, fig. 5, 1855.

One specimen was collected at Johnston Island. Previous records indicate the range of the species to be from Mauritius and the Red Sea through the Indian Archipelago, to New Caledonia and northward to Hawaii. The "Albatross" took the species near Laysan in 1902, and in recent years I have taken it on the reefs of Oahu.

***Oreophorus (Oreotlos) latus* (Borradaile).**

*Tlos latus* Borradaile, Fauna and Geogr. Maldives and Laccadive Archipelagoes, vol. 1, pt. 4, p. 437, text fig. 115, 1903.

*Oreophorus (Oreotlos) latus* Ihle, Decapoda Brachyura der Siboga-Expedition, III, p. 217, 1918.

Two specimens were taken by the Tanager Expedition at Laysan Island. Borradaile described the species from the Male Atolls in the Indian Ocean.

***Actaeomorpha erosa* Miers.**

*Actaeomorpha erosa* Miers, Linn. Soc. Journ., vol. 13, p. 183, pl. 14, figs. 1-6, 1878.

One young specimen which conforms closely to this species was collected at Ocean Island. The carapace of this specimen is not so deeply pitted as is that of an adult of this species which I took on the south shore of Molokai in 1921. The type locality of the species is Port Curtis, Australia.

## Family CALAPPIDAE

***Calappa hepatica* (Linnaeus).**

*Calappa hepatica* Alcock, Asiat. Soc. Bengal Journ., vol. 65, p. 142, 1896.

Seven specimens in all were collected at Ocean, Johnston, and Wake islands, besides a carapace at Laysan Island. The species is distributed

from the Red Sea through the Indian and Pacific oceans as far north as Hawaii, where it is very common about the larger islands of the group.

**Calappa gallus** (Herbst).

*Calappa gallus* Alcock, Asiat. Soc. Bengal Journ., vol. 65, p. 146, 1896.

One specimen was taken at French Frigate Shoals and one at Wake Island. The species apparently has a range from the Red Sea, through the Indian and Pacific oceans parallel with that of the preceding species but is much less common than *Calappa hepatica* in Hawaii. The species has been reported from West African localities by Rathbun and Bouvier, and is also known from the Florida Keys to the shores of Brazil.

Subtribe BRACHYGNATHA

Family INACHIDAE

**Perinea tumida** Dana.

*Perinea tumida* Dana, U. S. Expl. Exped. vol. 13, Crust., p. 114, 1852; pl. 4, fig. 1 a-f, 1855.

This species is well distributed throughout the area surveyed by the Tanager Expedition. Fifty-two specimens in all were taken at Pearl and Hermes Reef, French Frigate Shoals, Ocean, Laysan, Johnston, and Wake islands. Previous records of its distribution include the Red Sea, the Indian Ocean, Australia, Fiji and Hawaii. Dana's specimen was dredged at Lahaina, Maui. On the reefs of Oahu it is a common species.

**Menaethius monoceros** (Latreille).

*Menaethius monoceros* Alcock, Asiat. Soc. Bengal Journ., vol. 64, p. 197, 1895.

Seven specimens in all were collected at Pearl and Hermes Reef, Ocean, Lisiansky, and Laysan islands. The species ranges from the Red Sea through the Indian and Pacific oceans eastward to the Tuamotus and northward to Japan. Previous records include many localities in Hawaii where it is quite common.

**Simocarcinus simplex** (Dana).

*Simocarcinus simplex* Alcock, Asiat. Soc. Bengal Journ., vol. 64, p. 196, 1895.

Four specimens were taken at Laysan Island and six at Wake Island. There are previous records of the species from the Red Sea. Dana described it from Hawaii as *Huonia simplex*. It is very common on the reefs of Oahu where it lives among seaweed.

**Schizophrys hilensis** Rathbun.

*Schizophrys hilensis* Rathbun, U. S. Fish Comm. Bull., vol. 23, pt. 3, p. 882, text fig. 38, 1906.

Two specimens were taken at Pearl and Hermes Reef, one at Necker

Island and four at Laysan Island. The range of the species is apparently confined to the Hawaiian islands.

#### Family PARTHENOPIDAE

##### *Daldorfia horrida* (Linnaeus).

*Parthenope horrida* Alcock, Asiat. Soc. Bengal Journ., vol. 64, p. 279, 1895.

*Daldorfia horrida* Rathbun, U. S. Fish Comm. Bull., vol. 23, pt. 3, p. 886, pl. 14, fig. 5, text, fig. 39, 1906.

One specimen was taken by the Tanager Expedition at each of the following localities: French Frigate Shoals, Laysan, and Ocean islands. There are a number of previous records of the species from Hawaii. Lenz reported it from Laysan in 1901, and I have taken several specimens from the reefs of Oahu in recent years. Alcock listed it from off Ceylon and A. M. Edwards recorded it from New Caledonia. Its range probably also includes the Indian Ocean.

#### Family HAPALOCARCINIDAE

##### *Hapalocarcinus marsupialis* Stimpson.

*Hapalocarcinus marsupialis* Stimpson, Boston Soc. Nat. Hist. Proc., vol. 6, p. 412, 1856-1858; Calman, Linn. Soc. Zool. Trans., vol. 8, p. 43, 1900; Potts, Carnegie Inst. of Washington, Dept. Marine Biology papers, vol. 8, p. 35, 1915.

Twenty-three specimens in all were collected at Laysan, Johnston, and Wake islands. In Hawaii the species is very common, usually forming galls on the coral, *Pocillopora cespitosa*, and occasionally on *P. meandrina* var. *nobilis*. At Johnston Island, however, where *P. cespitosa* is rare and very poorly developed the galls of the crab are almost always found on a coral of the *P. meandrina* form. At Laysan and Wake islands *P. cespitosa* grows abundantly and vigorously and the galls of the crab were not observed on any other species of coral. The range of this commensal crab includes the Indian and Pacific oceans conforming with the distribution of coral reefs bearing species of the genera *Pocillopora*, *Seriatopora*, *Stylophora*, *Sideropora* and *Millepora*.

##### *Cryptochirus coralliodytes* Heller. (Pl. I, D-F.)

*Cryptochirus coralliodytes* Heller, Beitr. 2, Crustaceen-Fauna des rothen Meeres. S. B. Akad. Wien. vol. 43, (1), p. 370, pl. 4, figs. 33-35, 1861.

A form which I have placed under this species was taken at Wake Island, inhabiting pits in a coral head which appears to be *Favia matthaii* Vaughan. The crab conforms very closely with the original description of the species as given by Heller. A perfect specimen of an ovigerous female was secured having a carapace 5 mm. long and 3.5 mm. broad. The circular pit in the coral head occupied by this specimen measured 4 mm. in diameter and 20 mm. deep.

**Cryptochirus crescentus**, new species. (Fig. 6, *a-i*; Pl. 1, *B, C*.)

Type specimen an ovigerous female with carapace  $2\frac{1}{4}$  mm. long by 2 mm. broad. Type locality, Johnston Island, occupying crescent-shaped burrows in *Pavona duerdeni* Vaughan, a coral not uncommon on the outer reef of that island. Type specimen in Bishop Museum collections No. 1805.

This new *Cryptochirus* is characterized by having a broad, depressed carapace (fig. 6, *a* and Pl. 1, *B*), the posterior three-fourths of which is flattened in a longitudinal direction, and but slightly convex transversely.

In the type specimen the anterior one-fourth of the carapace is bent down at an angle of 45 degrees (fig. 6, *b*). In the male specimen there is but a slight deflection of this portion of the carapace. In the largest female measured the carapace was 3 mm. long by  $2\frac{1}{2}$  mm. broad. The carapace of the largest male observed measured  $2\frac{1}{2}$  mm. in length by 2 mm. broad.

Type specimen with front border of carapace concave between the inner supra-orbital angles, margin of border roughened by small tubercles. Orbits, as viewed from above, deep V-shaped incisions, borders tuberculate, both inner and outer supraorbital angles bluntly pointed, covered with short, sharp tubercles, one of which on the inner supraorbital angle is spine-like. The deflected anterior portion of the carapace is marked by a deep, broad depression transversely across the pre-gastric region, the arms of which curve backward toward the posterior extremity of each antero-lateral border.

Upper surface of carapace entirely covered with tubercles, which on the posterior region are small and low, becoming larger and more spine like anteriorly. Antero-lateral borders of carapace with a row of spines of about the same size as those of the upper surface of the carapace in this region and with which they merge posteriorly. The lateral surfaces of the anterior portion of the carapace, which are nearly at right angles with the dorsal surface, are covered with small, rounded tubercles.

Eyestalks short, thick, medial surface with numerous sharp spines. Basal segment of antennule bordered anteriorly by spines and with dorsal and ventral surfaces granulate and tuberculate (fig. 6, *d*). The first four segments of the antenna (fig. 6, *e*) are shorter than the basal segment of the antennule.

Ischium of outer maxillipeds nearly as broad as long, with the merus deeply set in its outer distal border. Exposed surface of ischium granular and tuberculate; exopodite about one-half as long as outer border of ischium (fig. 6, *e*).

Chelipeds of type specimen similar in size (fig. 6, *f*). Merus not quite twice as long as broad, inner surface concave, outer surface convex, smooth; distal three-fourths of lower border flattened, slight serrations and small tubercles along upper border. Wrist with sharp tubercles on upper border, terminating in spines anteriorly. Palm of hand compressed laterally, approximately as broad as long, the rounded upper border being covered with tubercles which extend down over the upper portion of the inner surface of the palm. Fingers deflected, as long as palm, sharp pointed, tips crossing when closed, cutting edges smooth. A few hairs and short bristles fringe the upper and lower borders of each segment of the cheliped. Entire length of cheliped in type specimen 2 mm.

The second leg in the type specimen (fig. 6, *g*) is much stouter than the cheliped; coxopodite with a strong spine on the upper border; merus as broad as long, both lateral and medial surfaces concave, medial surface strongly so. Distally the merus is expanded into a lobe-like extension, directed medially. Into the deep concavity of

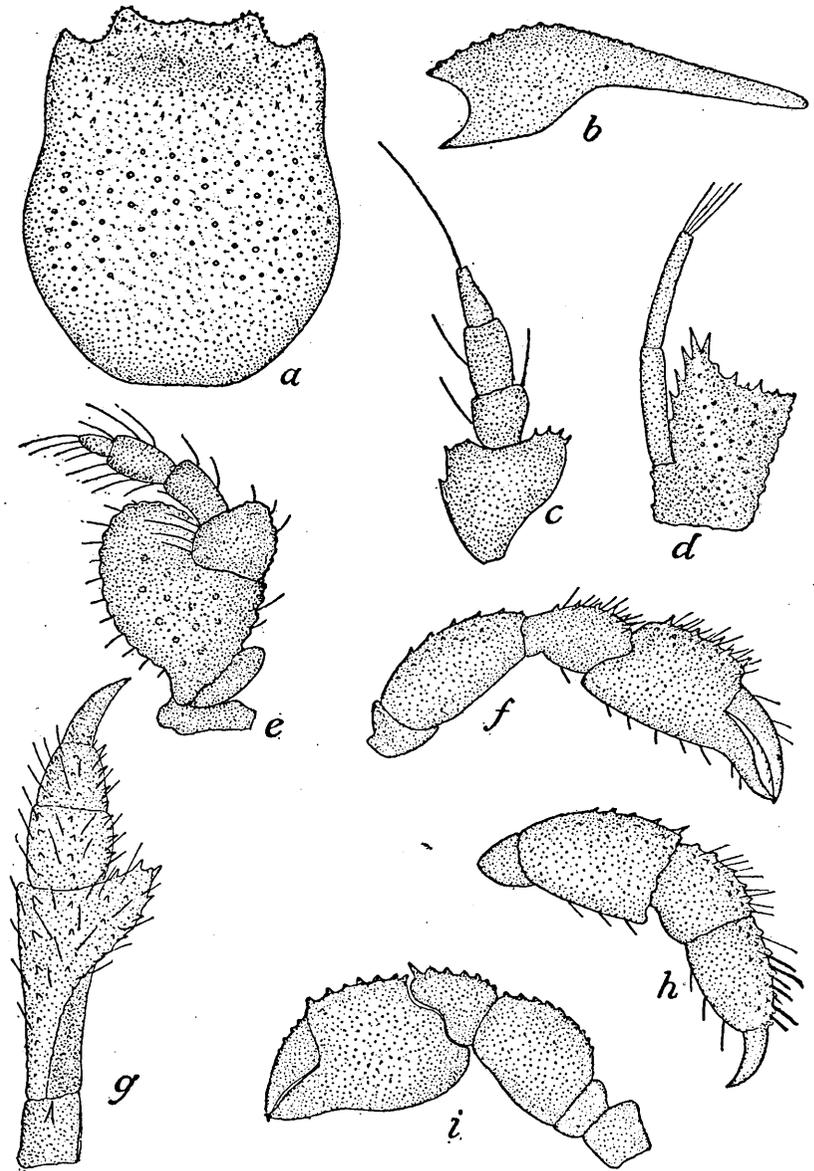


FIGURE 6. *Cryptochirus crescentus*, new species: *a*, dorsal surface of carapace; *b*, lateral view of carapace; *c*, right antenna from ventral surface; *d*, left antennule from ventral surface; *e*, outer maxilliped, left side; *f*, right cheliped (♀); *g*, second leg (♀), left side; *h*, fourth walking leg (♀), right side; *i*, left cheliped (♂).

the medial surface of the merus fits the cheliped while the third leg rests in the concavity of the lateral surface. Lower border of merus rounded and roughened by small tubercles; upper border narrow proximally, broadly rounded or almost flattened distally, covered by rounded tubercles many of which are spine-like. Carpus and propodus each short, stout, covered with sharp tubercles. The stout dactylus is slightly roughened by tubercles at the base. Long hairs are interspersed with the tubercles on the upper border of the segments.

The fifth leg is smaller than the fourth and the fourth smaller than the third; merus in third and fourth leg as broad as long, and a little longer in proportion to breadth in the fifth. A blunt, tooth-like process terminates the distal extremity of the lower border of the merus in each of the three legs. Carpus and propodus in these three legs short and stout, surface of segments more or less roughened by tubercles, some of which become sharp especially along the upper borders (fig. 6, h). Fifth leg smoother than fourth, and fourth smoother than third. Hairs and bristles fringe the borders of the segments of the legs.

In this species the male differs from the female in size and in the more flattened character of the carapace, as previously mentioned. A sexual difference is also noted in the appendages. The chelipeds of the male (fig. 6, i) are longer than those of the female, the hands being more massive and the fingers shorter. In the male the merus of the second leg is less widely expanded at the distal extremity than in the female. The abdomen of the male consists of seven distinct segments with the sides gradually converging to the rounded distal extremity.

Most of the crescent-shaped pits in *Pavona duerdeni* inhabited by this species (Pl. I, C) are from 11 to 12 mm. deep, although one measured was 18 mm. deep. The convexity of the opening of the pit is dorsal in relation to the crab, the flattened or concave side of the crescent being ventral. At the tips of the crescent are observed small rounded pockets which extend to a lower level than the ventral floor of the opening. In these pockets the distally expanded extremity of the second leg of the crab rests. Males and females have been found in separate pits in the same coral colony.

That this species also ranges into the Hawaiian islands is shown by the presence of similar pits in specimens of *Pavona duerdeni* taken at Pukoo, Molokai, and now in the Bishop Museum. All of the pits in these preserved and bleached specimens of coral are, however, free from crabs. The same species of coral collected on Waikiki reef, Honolulu, in 1924 showed no evidence of the presence of the crab.

Verrill (28) described a coral crab, inhabiting semicircular or lunate pits in several species of corals of Bermuda, under the name *Troglacarcinus coralliocola*, the generic term employed also being new. Verrill's form which is probably a *Cryptochirus* seems to differ from the Johnston Island species in the character of the spines of the antero-lateral border, in the outer maxillipeds, and perhaps in the chelipeds and first pair of walking legs.

The Johnston Island species may readily be distinguished from either *Cryptochirus coralliodytes* Heller or *Cryptochirus dimorphus* Henderson (18), which are Indo-Pacific in distribution, by the form of the carapace, the chelipeds and first pair of walking legs, as well as by the shape of the cavity in the coral which it inhabits.

## Family CANCRIDAE

**Kraussia rugulosa** (Krauss).

*Kraussia rugulosa* Dana, U. S. Expl. Exped. vol. 13, Crust., p. 302, 1852; pl. 19, fig. a-f, 1855.

Three specimens which agree with Dana's description were taken at Wake Island. Dana reported the species from the island of Maui. Krauss recorded it from South Africa. Although it seems to have an extensive range it has been taken in few localities.

## Family PORTUNIDAE

**Lissocarcinus orbicularis** Dana.

*Lissocarcinus orbicularis* Alcock, Asiat. Soc. Bengal Journ., vol. 68, p. 20, 1899.

One specimen was collected at Wake Island. Previous records are from the Red Sea, the Indian Ocean, Ceylon, Torres Straits, and through the Pacific to Hawaii. On the reefs of Oahu it is a very common species, living as a commensal in the oral regions of the holothurian, *Holothuria fusco-rubra* Théel.

**Carupa laeviuscula** Heller.

*Carupa laeviuscula* Alcock, Asiat. Soc. Bengal Journ., vol. 68, p. 26, 1899.

Five specimens in all were collected at Pearl and Hermes Reef, Lisiansky, and Wake islands. Previous records indicate a wide range of the species, including the Red Sea, the Indian Ocean and eastward in the Pacific to the Tuamotus and northward to Hawaii. Lenz reported it from Laysan Island in 1901. The Bishop Museum collections include numerous specimens from Oahu.

**Goniocaphyra inaequalis** Rathbun.

*Goniocaphyra inaequalis* Rathbun, U. S. Fish Comm. Bull., vol. 23, pt. 3, p. 870, pl. 12, fig. 9, text fig. 29, 1906.

Thirteen specimens were collected at Johnston Island from dead coral heads in shallow water. Previous records of the species are from Hawaii, where it was taken by the "Albatross" at depths ranging from 13 to 179 fathoms. I have taken a number of specimens on Waikiki reef, Oahu, in shallow water.

**Portunus (Xiphonectes) longispinosus** (Dana).

*Portunus (Xiphonectes) longispinosus* Rathbun, Mus. Comp. Zool. Bull., vol. 39, p. 130, 1902.

One specimen was taken by the Tanager Expedition at Laysan Island and one at Johnston Island. The range of the species is from the Red Sea through the Indian and Pacific oceans to Hawaii. Dana's record was from Fiji.

**Portunus (Achelous) granulatus** (Milne Edwards).

*Neptunus (Achelous) granulatus* Alcock, Asiat. Soc. Bengal Journ., vol. 68, p. 45, 1899.

Six specimens were taken in the lagoon at Wake Island. The species ranges from Mauritius and the Red Sea through the Indian and Pacific oceans eastward to the Tuamotus and northward to China, Japan, and Hawaii. Lenz reported it from Laysan Island in 1901. The Wake Island specimens were of such color as to blend perfectly with the white coral sand on which they rested and in which they burrowed.

**Portunus pubescens** (Dana).

*Luva pubescens* Dana, U. S. Expl. Exped., vol. 13, Crust., p. 274, 1852; pl. 16, fig. 9, 1855.

Two specimens and a carapace were collected at Laysan Island, and one specimen at Lisiansky Island. Dana's record of the species was from Maui, and it is not uncommon in the shallow waters about Oahu.

**Charybdis erythroductyla** (Lamarek).

*Thalamita pulchra* Randall, Acad. Nat. Sci. Phila. Journ., vol. 8, p. 117, pl. 4, 1839 (1840).

One specimen was collected by the Tanager Expedition at Wake Island. The species apparently ranges from the Red Sea through the Indian and Pacific oceans to Hawaii where it has frequently been taken. It is occasionally seen in the Honolulu fish market.

**Thalamita admete** (Herbst).

*Cancer admete* Herbst, Natur. d. Krabben u. Krebse, III, pt. 3, p. 49, pl. 57, fig. 1, 1803.

*Thalamita admete* Rathbun, U. S. Fish Comm. Bull., vol. 23, pt. 3, p. 874, 1906.

Nine specimens which correspond closely with Rathbun's application of the species were taken at Wake Island. Rathbun records the species, which is probably a variable one, from the China Sea, Samoa, Lord Howe Island, and Hawaii. The *T. admete* of Alcock, Borradaile and other authors has a much wider range, including the Red Sea and various localities in the Indian and Pacific oceans.

**Thalamita edwardsi** Borradaile.

*Thalamita edwardsi* Borradaile, Zool. Soc., London Proc., 1900, p. 579; Fauna and Geogr. Maldives and Laccadive Archipelagoes, vol. 1, p. 262, 1902; Rathbun, U. S. Fish Comm. Bull., vol. 23, pt. 3, p. 873, 1906.

Forty-five specimens in all were collected at Pearl and Hermes Reef, Ocean, Lisiansky, Laysan, and Johnston islands. Previous records of the species are from the Indian Ocean, Funafuti, Palmyra Island, and Hawaii. It is the most common species of the genus in Hawaii and also at Johnston Island.

**Thalamita picta** Stimpson.

*Thalamita picta* Stimpson, Acad. Nat. Sci. Phila. Proc., vol. 10, p. 39, 1858.

Four specimens in all were taken at Pearl and Hermes Reef, Necker and Wake islands. The species has a wide range from the Red Sea through the Indian and Pacific oceans. It has previously been reported from New Caledonia, Rotuma and Hawaii in the Pacific.

**Thalamita wakensis**, new species. (Fig. 7, *a-e*; Pl. III, *A*.)

Holotype, a male; greatest width of carapace 8 mm., length of carapace 5 mm. Type locality, Wake Island, shallow water on the reef. Bishop Museum collections No. 1807.

This apparently new *Thalamita* has the basal segment of the antenna shorter than the major diameter of the orbit and the front is cut into six lobes, exclusive of the inner supraorbital angles. The middle lobes of the front are on a lower level than the submedian ones and are partially overlapped by the latter. With respect to the frontal border the species resembles *T. imparimanus* Alcock (3, p. 87), but differs from that species in the character of the antero-lateral margin of the carapace, in the chelipeds and in the propodite of the last leg.

Carapace slightly convex, covered with short pile which does not conceal the transverse ridges which are disposed as in *T. crenata* (Latreille) with, however, an additional one across the cardiac region (Pl. III, *A*; fig. 7, *a*). The immediate post-frontal region of the carapace is covered with rounded granules. Supraorbital border finely crenulate, with two shallow grooves, the medial one the more prominent.

Antero-lateral borders cut into four acute teeth, of which the first, or outer orbital angle, is larger than the second, and the second is larger than the third, while the fourth is slightly longer and straighter than the second. This fourth tooth represents the fifth of those usually present, the fourth of those usually present being wholly absent. In the number and relative size of the teeth of the antero-lateral border, this species is in close agreement with *T. hanseni* Alcock (3, p. 88) and *T. pilumnoides* Borradaile (4, p. 207). The posterior border of the carapace is approximately one-third its greatest width.

The crenulated lower border of the orbit has a deep notch toward the lateral side and the inner angle is an obtuse tooth. Basal segment of antenna approximately one-half the length of the greatest diameter of the orbit, with three prominent tubercles on the basal half of its exposed surface and a crest of smaller tubercles with their bases fused on the distal half. The free extremity of the basal segment is evenly rounded.

Left cheliped in the type specimen (fig. 7, *c*) slightly larger than the right. Anterior border of arm with a row of five spines increasing in size distally; other surfaces of arm quite smooth, with a few scattered hairs. Upper and outer surfaces of wrist weakly costate, granular, with three short teeth; inner angle with a strong, sharp tooth. Hairs are interspersed with the granules on the wrist. Palm of hand with five distinct costae on upper and outer surfaces; upper costa with two spines, the proximal one the stronger; second costa granular proximally, with two spines, the distal one the smaller. A prominent spine appears near the articulation with the wrist. Third, fourth and fifth costae granular, the fourth extending, with a break and at a lower level, forward on the lateral surface of the immovable finger; the fifth extending without interruption the length of the immovable finger on its lower lateral surface. Lower surface of palm rounded, inner surface inflated, both finely but sparsely granulate.

Fingers slender, strongly hooked, longitudinally channelled, the movable one

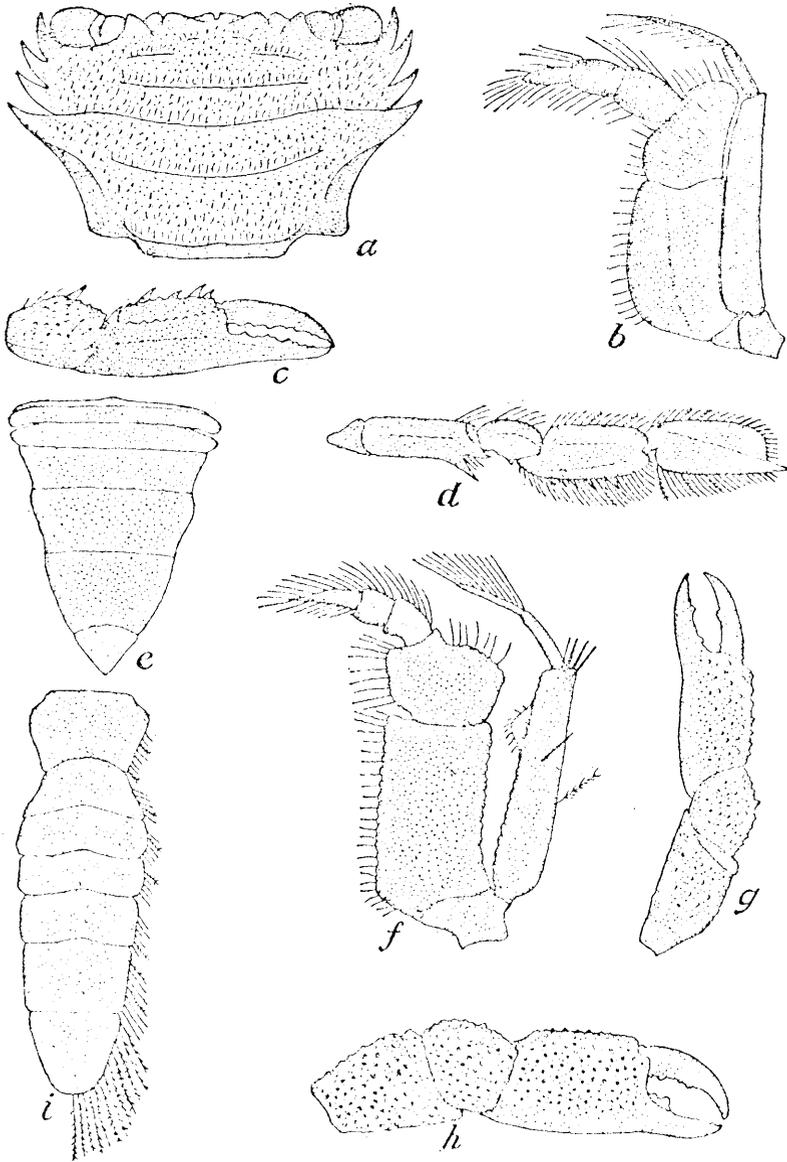


FIGURE 7. *Thalamita roakensis* (a-e) and *Chlorodiella asper* (f-i), new species: a, carapace, dorsal surface; b, outer maxilliped, left side; c, wrist and chela, right side; d, fifth leg, right side; e, telson; f, outer maxilliped, left side; g, left cheliped; h, right cheliped; i, abdomen.

slightly exceeding in length the upper border of the palm. Total length of left cheliped, 10 mm.

Second, third and fourth legs similar except in size. Third exceeding second in length by one-fourth the length of the dactylus; fourth but slightly exceeding third in length. Merus sharp above, carpus, propodus and dactylus grooved longitudinally on both anterior and posterior surfaces, a dense row of long hairs occupying the groove near the upper border of the anterior surface of these segments. In the second leg two additional parallel rows of hairs extend longitudinally on the anterior border of carpus and propodus. Dactylus slender, curved, in fourth leg equalling propodus in length. Fifth leg reaching almost to distal extremity of propodus of fourth leg.

Merus of fifth leg (fig. 7, *d*) slightly more than twice as long as broad, terminating on lower distal border in a sharp tooth, with another one subterminally placed. Lower border of propodus armed with seven spinules increasing in length toward the distal extremity. Upper and lower borders of segments of fifth leg fringed with hairs, which become feathered on the propodus and dactylus and spine-like toward the distal extremity of the terminal segment.

Terminal segment of abdomen of type specimen triangular, slightly broader than long. Total length of abdomen 4.5 mm. (fig. 7, *e*).

***Thalamitoides quadridens* A. M. Edwards.**

*Thalamitoides quadridens* A. M. Edwards, Mus. Hist. Nat. Nouv. Arch., vol. 5, p. 147, pl. 6, figs. 8-15, 1869.

One specimen was taken at Johnston Island. Previous records of the species include Madagascar, Jaluit, and Samoa. There is a specimen of a closely related species, *T. tridens* A. M. Edwards, in the Bishop Museum from Guam.

Family PILUMNIDAE

***Lybia tessellata* (Latreille).**

*Melia tessellata* Borradaile, Fauna and Geogr. Maldives and Laccadive Archipelagoes, vol. 1, p. 250, fig. 49, 1903.

Fifteen specimens in all were collected at Pearl and Hermes Reef, French Frigate Shoals, Ocean and Wake islands. The species has a wide range through the Indian and Pacific oceans northward to Hawaii where it has often been taken. Dana collected it at Wake Island in 1841. The species usually carries a small sea anemone in each chela.

***Domecia hispida* Eydoux and Souleyet.**

*Domecia hispida* Alcock, Asiat. Soc. Bengal Journ., vol. 67, p. 230, 1898.

Ninety-eight specimens in all were collected at Pearl and Hermes Reef, French Frigate Shoals, Ocean, Lisiansky, Laysan, Johnston, and Wake islands. The species has an extensive range through the Indian and Pacific oceans, and may generally be found where reef-forming coral exists. It has also been recorded from the West Indies.

***Tetralia glaberrima* (Herbst).**

*Tetralia glaberrima* Alcock, Asiat. Soc. Bengal Journ., vol. 67, p. 223, 1898.

Four specimens were taken at Johnston Island and 16 at Wake Island.

Previous records of the species include the Red Sea, various localities in the Indian Ocean and the Pacific as far as the Tuamotus. It is common at Palmyra Island but its distribution does not include Hawaii. It is associated with living coral.

***Trapezia digitalis* (Latreille).**

*Trapezia digitalis* Alcock, *Asiat. Soc. Bengal Journ.*, vol. 67, p. 222, 1898.

Forty-two specimens were collected at Laysan, Johnston, and Wake islands, the species being very common at Wake. Its distribution includes the Red Sea, the Indian and Pacific oceans to Hawaii, and also the Pacific shores of Mexico. Like other species of the genus it is associated with living coral.

***Trapezia digitalis speciosa* (Dana).**

*Trapezia speciosa* Dana, *U. S. Expl. Exped.*, vol. 13, *Crust.*, p. 253, 1852; pl. 15, fig. 1, 1855.

Four specimens were collected at Johnston Island and eight at Wake Island. The range of the species is from Mauritius through the Indian and Pacific oceans to the Tuamotus. Dana's specimens were taken from the Tuamotus.

***Trapezia cymodoce intermedia* Miers.**

*Trapezia ferruginea* var. *intermedia* Miers, *Voyage of the "Challenger,"* vol. 17, *Brachyura*, p. 168, pl. 12, fig. 2, 1886.

Ninety-four specimens in all were taken at Pearl and Hermes Reef, French Frigate Shoals, Ocean, Laysan, and Johnston islands. The range of the species is from the Indian Ocean to Hawaii.

***Trapezia cymodoce ferruginea* (Latreille).**

*Trapezia ferruginea* Alcock, *Asiat. Soc. Bengal Journ.*, vol. 67, p. 220, 1898.

Two specimens were taken at Johnston Island and 28 at Wake Island. The known range of the species is from the Red Sea, through the Indian and Pacific oceans to the shores of Mexico and Easter Island. It is very common at Palmyra Island and has frequently been taken in Hawaii although it is not represented in the Tanager collections from the leeward islands of Hawaii.

***Trapezia rufopunctata* (Herbst).**

*Trapezia rufopunctata* Alcock, *Asiat. Soc. Bengal Journ.*, vol. 67, p. 222, 1898.

Seventy-four specimens in all were taken at Pearl and Hermes Reef, Ocean, Lisiansky, Laysan, Johnston, and Wake islands. The species is known to range through the Indian and Pacific oceans to the Tuamotus and Hawaii.

**Actumnus obesus** Dana.

*Actumnus obesus* Dana, U. S. Expl. Exped., vol. 13, Crust., p. 244, 1852; pl. 14, fig. 3, 1855.

One specimen was taken at French Frigate Shoals and two at Wake Island, all in shallow water. The species has been reported from the Red Sea and the Indian Ocean. Dana's specimen was dredged near Lahaina, Maui. The "Albatross" took it off Molokai down to 73 fathoms. It has also been dredged off Waikiki reef, Honolulu, at from 30-50 fathoms, and has been collected in shallow water at other localities about Oahu.

**Pilumnus cursor** A. M. Edwards.

*Pilumnus cursor* A. M. Edwards, Mus. Hist. Nat. Nouv. Arch., vol. 9, p. 244, pl. 9, fig. 4, 1873; Alcock, Asiat. Soc. Bengal Journ., vol. 67, p. 195, 1898.

Eight specimens, taken at Wake Island, correspond closely with the descriptions of the species as given by Edwards and Alcock. The previously known distribution of *P. cursor* includes Australia, New Caledonia, Funafuti, and Samoa.

**Dacryopilumnus eremita** Nobili.

*Dacryopilumnus eremita* Nobili, Mus. Nat. Hist. Bull., Paris, 1906, p. 264; R. Accad. Sci. Torino Mem. 2, vol. 57, p. 400, pl. 2, figs. 4-4b, 1907.

One specimen was collected at Wake Island. Previous records of the species are from Rikitea, Makatea, Hao, and Amanu in the Tuamotu Islands. Nobili says the specimens from the Tuamotus were found in holes in dead madrepores.

**Eriphia scabricula** Dana.

*Eriphia scabricula* Dana, U. S. Expl. Exped., vol. 13, Crust., p. 247, 1852; pl. 14, figs. 5a and 5b, 1855.

One specimen was taken at Wake Island. The range of the species is from the Red Sea, through the Indian and Pacific Oceans to Australia and the Tuamotus. It is very common at Fanning Island and less so at Palmyra Island.

**Lydia annulipes** (Milne Edwards).

*Ozius* (Eurupellia) *annulipes* Alcock, Asiat. Soc. Bengal Journ., vol. 67, p. 188, 1898.

Twenty-three specimens were collected at Wake Island. Previous records include Muscat, the Liu Kiu Islands, Guam, Rotuma, Samoa, Marcus Island, Fanning and Palmyra islands and Hawaii.

**Pseudozius caystrus** (Adams and White).

*Pseudozius caystrus* Alcock, Asiat. Soc. Bengal Journ., vol. 67, p. 181, 1898.

Fifty-one specimens were collected at Wake Island. The species is distributed from the Red Sea through the Indian and Pacific oceans to the

Tuamotus and Hawaii, and is also known from Guam. It is very common at Palmyra and Fanning islands.

**Pilodius flavus** Rathbun.

*Pilodius flavus* Rathbun, U. S. Nat. Mus. Proc., vol. 16, p. 239, 1893; U. S. Fish Comm. Bull., vol. 23, pt. 3, p. 860, text-fig. 21, 1906.

Two specimens were taken at Pearl and Hermes Reef and two at Ocean Island, all in shallow water on the reefs. Rathbun reports the species from a number of localities among the leeward islands of the Hawaiian group at depths ranging from 14 to 160 fathoms. It has been taken off Waikiki reef, Oahu, in 30 to 50 fathoms, and also on the same reef in shallow water.

**Cymo andreossi** (Audouin).

*Cymo andreossi* Alcock, Asiat. Soc. Bengal Journ., vol. 67, p. 173, 1898.

Three specimens were collected at Wake Island. The species ranges from the Red Sea through the Indian Ocean and is known in the Pacific from Japan to Tahiti. It is a common form at Palmyra Island but has not been recorded from Hawaii and was not observed at Johnston Island during the Tanager Expedition.

**Cymo melanodactylus** de Haan.

*Cymo melanodactylus* Alcock, Asiat. Soc. Bengal Journ., vol. 67, p. 174, 1898.

Forty-eight specimens were collected at Wake Island. The species is known to range from the Red Sea through the Indian Ocean, and is known in the Pacific from China and Japan to Australia and the Tuamotus. It reaches Fanning and Palmyra islands but has not been recorded from Hawaii and was not taken at Johnston Island by the "Tanager." At Wake Island it is a very common species associated with coral colonies in the south channel leading from the lagoon to the sea.

**Chlorodopsis scabricula** (Dana).

*Pilodius scabriculus* Dana, U. S. Expl. Exped., vol. 13, Crust., p. 220, 1852; pl. 12, fig. 9, 1855.

Fifty-five specimens were collected at Wake Island where it is a very common species. It has been previously reported from the Indian Ocean, Balibac Passage, Tahiti, the Tuamotus, Fanning and Palmyra islands, and Hawaii. The species apparently does not range through the leeward islands of the Hawaiian group and was not seen at Johnston Island during the survey of the "Tanager." It is not common in Hawaii.

**Chlorodopsis aberrans** Rathbun.

*Chlorodopsis aberrans* Rathbun, U. S. Fish Comm. Bull., vol. 23, pt. 3, p. 859, text fig. 20, 1906.

Fifteen specimens were collected at Johnston Island. The type specimen,

described by Rathbun, was taken near Nihoa by the "Albatross" at depths from 23 to 26 fathoms. I know of no other record of the species.

**Phymodius nitidus** (Dana).

*Pilodius nitidus* Dana, U. S. Expl. Exped., vol. 13, Crust., p. 218, 1852; pl. 12, fig. 7, 1855.

In all, 185 specimens were taken at Pearl and Hermes Reef, French Frigate Shoals, Lisiansky, Laysan, Necker, Johnston, and Wake islands. It is especially well represented in collections from French Frigate Shoals, Lisiansky, Laysan, and Johnston islands. Previous records include localities in the Indian Ocean, Samoa, Fanning, and Palmyra islands, and Hawaii. It is very common on the reefs of Oahu.

**Phymodius laysani** Rathbun.

*Phymodius laysani* Rathbun, U. S. Fish Comm. Bull., vol. 23, pt. 3, pl. 12, fig. 8, text fig. 19, 1906.

One hundred and twenty-one specimens in all were taken at Pearl and Hermes Reef, French Frigate Shoals, Ocean, Laysan, and Johnston islands. It was well represented in collections from Ocean and Laysan islands and was very abundant at Johnston, where 81 of the specimens were collected. Rathbun described the species from a specimen taken at Laysan Island in 1902. A number of specimens collected on Waikiki reef, Oahu, are in the Bishop Museum.

**Phymodius ungulatus** (Milne Edwards).

*Phymodius ungulatus* Alcock, Asiat. Soc. Bengal Journ., vol. 67, p. 162, 1898.

Ninety-four specimens in all were taken, of which 85 are in collections from Wake Island, the others being from Pearl and Hermes Reef, Lisiansky, and Laysan islands. The species ranges from Mauritius and the Red Sea throughout the Indian Ocean and in the Pacific to the Tuamotus and Hawaii.

**Chlorodiella niger** (Forskål).

*Chlorodiella niger* Alcock, Asiat. Soc. Bengal Journ., vol. 67, p. 160, 1898.

In all, 775 specimens were taken, the species being well represented in collections from all of the low islands covered by the Tanager Expedition. This common species is widely distributed from the Red Sea through the Indian and Pacific oceans to the Tuamotus and northward to Hawaii.

**Chlorodiella asper**, new species. (Fig. 7, *f-i*; Pl. III, C.)

Type specimen an ovigerous female; greatest width of carapace 4 mm., length of carapace 3 mm. Type locality, Johnston Island. Bishop Museum collections No. 1810.

Carapace ovoid, dorsal surface slightly convex (Pl. III, C); gastric and cardiac regions faintly outlined by very shallow grooves; general surface smooth, slightly

roughened on the post-frontal and hepatic areas by granules and rounded tubercles of microscopic size, the latter distributed backward along the branchial border; surface sparsely covered with short yellowish bristles.

Front a little more than one-third the width of the carapace with a broad shallow emargination in the middle line. Supraorbital border slightly raised and with two faint sutures, the lateral one hardly noticeable. Antero-lateral border rounded, confluent with the posterior border; teeth of antero-lateral border inconspicuous, the first, or outer orbital angle, a continuation of the supraorbital border, the second hardly distinguished from the small tubercles of the antero-lateral border, the third, fourth and fifth represented by slightly more prominent and sharper tubercles than those of the general border.

Right cheliped in type specimen (fig. 7, *h*) larger than the left, and twice the length of the carapace. Arm as broad as long, the anterior border with short teeth, outer surface covered with low, rounded tubercles with a few short bristles interspersed. Wrist stout, almost as long as arm, outer and upper surfaces covered by tubercles similar to those of the arm; inner angle with a strong tubercle more prominent than those of the general surface. Numerous bristles are scattered over the outer surface of the wrist.

Palm of hand stout, as wide as the upper border is long; upper and lower borders rounded; upper half of outer and upper part of inner surfaces covered by low rounded tubercles similar to those of wrist and arm; lower half of outer and inner surfaces and lower border smooth. A few bristles are interspersed among the tubercles of the hand. Fingers stout, spoon-like at tips. Movable finger tuberculate at the base, grooved longitudinally, strongly arched, as long as the upper border of the palm and with a stout tooth at the base and one near the middle. Immobile finger with a stout tooth at the base and two smaller ones near the tip. Fingers widely gaping when closed.

Left cheliped in type specimen (fig. 7, *g*) resembling the right except shorter and more slender; tubercles on outer surface of palm relatively larger and disposed in longitudinal series; fingers less strongly arched than in the right cheliped.

Walking legs with upper borders of merus and carpus sharp, the proximal two-thirds of upper border of merus faintly serrate, the entire lower border with low, rounded teeth. Upper border of carpus with sharp granules, lower border smooth; upper and lower borders of propodus and basal portion of dactylus armed with sharp granules or spinules, those on the lower border of dactylus amounting to short, conical teeth which increase in length from basal to distal extremity of portion of border occupied by them. A deep constriction occurs in the lower border of the propodus distal of the middle. Dactylus strongly hooked and slightly longer than the propodus. Long bristles are carried on the upper and lower borders of the segments and the dactylus is well covered by them.

The male of this species differs from the female chiefly in size. The largest of the males collected is slightly smaller than the type specimen. As in all species of the genus, the abdomen of the male shows a fusion of the third, fourth and fifth segments.

Color of type specimen, in alcohol, light brown, base of fingers dark brown, tips white.

This species is readily distinguished from *Chlorodiella niger* (Forskål) and *Chlorodiella lacvissima* (Dana), which are nearly identical, by the character of the surface of the carapace and chelipeds which, in the last two species, are comparatively smooth.

**Euxanthus minutus**, new species. (Fig. 8, *a-d*; Pl. III, *B*.)

Type specimen an ovigerous female: greatest width of carapace 4.5 mm., length 3.5 mm. Type locality, Wake Island, in shallow water. Bishop Museum collections No. 1808.

Front deflexed, not quite one-half the greatest width of the carapace, almost straight, bilobed, the lobes separated from each other in the mid-line by a narrow incision and from the supraorbital borders by shallow depressions. Dorsal surface of carapace subdivided into areas by broad grooves. The lobules of anterior areas of the carapace are prominent, rounded, while those of the posterior region are low and flat (Pl. III, *B*). Three deep parallel grooves traverse the frontal and medial regions in a longitudinal direction, the extra-medial areas being subdivided for about one-half their length. Broad grooves extend diagonally inward to the gastric and cardiac regions from the fourth and fifth antero-lateral teeth, a narrow but distinct ridge forming the posterior border of the groove extending inward from the fifth tooth. Medial two-thirds of supraorbital border prominent, broadly rounded, lateral one-third low and thin, two inconspicuous notches being in the thinner edge.

Antero-lateral border with five teeth, the first being represented by the low, blunt outer orbital angle, the others being broadly triangular, rounded at tips. The third tooth is the most prominent. The entire upper surface of the carapace, including the lobules, grooves and the teeth of the antero-lateral border, is covered with minute, closely set, rounded tubercles.

Medial angle of the sub-orbital border a prominent, rounded lobe. Basal segment of antenna filling the gap between supra and suborbital borders, with the free end deeply excavated for the reception of the flagellum. Flagellum resting in the orbit but shorter than its major diameter. Ventral surface of carapace, including epistomial and pterygostomial regions, covered by rounded tubercles similar to those of the dorsal surface. Exposed surface of merus of outer maxillipeds roughened by tubercles and sharp granules (fig. 8, *a*).

Chelipeds short, stout, in the type specimen the right one is the larger (fig. 8, *b*). Merus of right cheliped as broad as long, inner surface concave, smooth, outer surface strongly convex; upper and lower inner borders sharp, beaded with minute tubercles, and with some hair along the upper border; upper, outer and lower surfaces closely covered with small rounded tubercles similar to those of the carapace. Wrist as long as the merus, upper and outer surfaces pitted and eroded in an irregular manner and closely covered with minute tubercles similar to those of the merus; upper, inner border sharp and marked by three small, tooth-like elevations, the more distal one being the stronger and representing the inner angle of the wrist. Palm of hand slightly longer than broad, inner surface swollen in the middle, covered with minute, smooth tubercles which, near the upper border, become more ridge-like and elongate in a vertical direction. Upper border of palm roughened with three longitudinal rows of irregular elevations between which the surface is pitted and eroded. Midway of the outer surface two parallel, finely tuberculate ridges arch longitudinally across the palm, the tubercles of the upper ridge being slightly larger than those of the lower ridge which continues forward on the surface of the immovable finger. Lower border of hand sharp; entire upper, outer and lower surfaces closely covered with small rounded tubercles. Fingers short, stout, each tuberculate, longitudinally channelled, bluntly pointed, inconspicuously hollowed at the tip, and with two large, rounded teeth.

Left cheliped smaller than right, fingers more slender, less strongly toothed, and more conspicuously hollowed at the tips.

Merus of walking legs a little more than twice as long as broad, upper border sharp and finely serrated; upper border of carpus, propodus and, to a lesser extent, the dactylus with a broad, shallow longitudinal groove; outer surface of propodus traversed longitudinally by a medial ridge, more conspicuous in the second and third

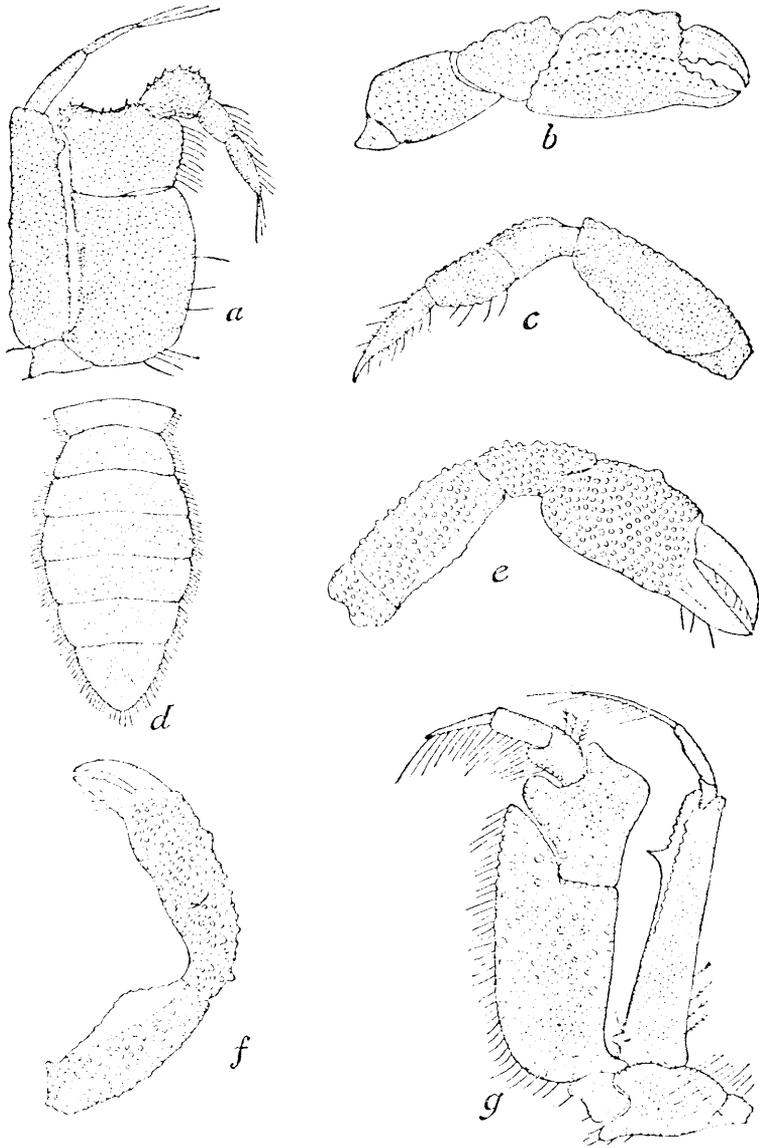


FIGURE 8. *Euxanthus minutus* (a-d) and *Palicus tuberculatus* (e-g), new species: a, outer maxilliped, right side; b, right cheliped; c, second leg, left side; d, telson; e, right cheliped; f, left cheliped; g, outer maxilliped, left side.

legs (fig. 8, c). General surface of legs granular with sharp borders finely serrated. Surface of dactyli with numerous spinules and bristles.

A number of species of this genus are recorded by Dana (8, pp. 173-4) and A. M. Edwards (11) from the South Pacific, Australia and the East

Indies. The Wake Island species seems to differ from each of these in the character of the surface of the carapace, the antero-lateral teeth and the markings of the chelipeds.

**Cyclodius ornatus** Dana.

*Cyclodius ornatus* Dana, U. S. Expl. Exped., vol. 13, Crust., p. 223, 1852; pl. 12, fig. 11 a-g, 1855; Alcock, Asiat. Soc. Bengal Journ., vol. 67, p. 171, 1898.

One specimen was collected at Wake Island. Previous records of the species include the Sulu Sea, Fari Fari, Fakarava, Papeete, and the Tuamotus.

**Daira perlata** (Herbst).

*Daira perlata* Alcock, Asiat. Soc. Bengal Journ., vol. 67, p. 155, 1898.

Thirty-three specimens were collected at Wake Island which is apparently the only locality of the "Tanager" survey in which the species is represented. Previous records indicate the range of the species to be from Mauritius through the Indian and Pacific oceans to the Liu Kiu islands and eastward to Samoa and Tahiti. It has been taken at Fanning and Palmyra islands but seems not to have reached Hawaii. At Wake Island it is very common on the flat reefs facing the ocean where it conceals itself in the pits and holes of the rough surface.

**Xanthias lamarckii** (Milne Edwards).

*Xanthodes lamarckii* Alcock, Asiat. Soc. Bengal Journ., vol. 67, p. 157, 1898.

Twenty-six specimens were taken at Wake Island. The species is distributed from Mauritius through the Indian Ocean, and from the Philippines and Australia to the Tuamotus, ranging northward to Fanning and Palmyra islands and Hawaii.

**Xanthias notatus** (Dana).

*Xanthodes notatus* Alcock, Asiat. Soc. Bengal Journ., vol. 67, p. 158, 1898.

Five specimens were taken at Laysan Island and 15 at French Frigate Shoals. Localities from which the species has previously been reported include Christmas Island and the Nicobars in the Indian Ocean, New Caledonia, Rotuma, the Tuamotus, and Hawaii in the Pacific Ocean. It is not an uncommon species on the reefs of the larger islands of the Hawaiian group.

**Xanthias canaliculatus** Rathbun.

*Xanthias canaliculatus* Rathbun, U. S. Fish. Comm. Bull., vol. 23, pt. 3, p. 856, pl. 9, fig. 12, text fig. 17, 1906.

Two specimens were collected at French Frigate Shoals and one at Wake Island. The type specimen was taken at Honolulu in 1901. It is not an uncommon species on Waikiki reef, Oahu. Rathbun also records the species from the Tuamotus.

***Lioxantho punctatus* (Milne Edwards).**

*Lioxantho punctatus* Alcock, Asiat. Soc. Bengal Journ., vol. 67, p. 91, 1898.

Two specimens were collected at Wake Island. The range of the species as previously known included the Indian and Pacific oceans as far as Samoa.

***Actaea affinis* (Dana).**

*Actaeodes affinis* Dana, U. S. Expl. Exped., vol. 13, Crust., p. 197, 1852; pl. 11, fig. 3, 1855.

In all 117 specimens were taken, the species being a common one at all of the low islands covered by the survey. The species is widely distributed through the Indian Ocean and is known in the Pacific from the Philippines, Australia, and Japan to the Tuamotus. It is very common in Hawaii.

***Actaea speciosa* (Dana).**

*Actaea speciosa* Alcock, Asiat. Soc. Bengal Journ., vol. 67, p. 143, 1898.

Seventeen specimens in all were collected at Pearl and Hermes Reef, Ocean, Laysan, Johnston, and Wake islands. Previous records indicate the range of the species to be from the Persian Gulf through the Indian and Pacific oceans to Guam, Samoa, Funafuti, Palmyra, and Hawaii. There are former records from French Frigate Shoals and Laysan Island of leeward Hawaii. The species has been collected many times on the reefs of Oahu.

***Actaea hirsutissima* (Rüppell).**

*Actaea hirsutissima* Alcock, Asiat. Soc. Bengal Journ., vol. 67, p. 141, 1898.

One specimen was taken at French Frigate Shoals and three at Wake Island. The species is distributed from the Red Sea through the Indian and Pacific oceans to Japan, Australia, Samoa, Rotuma, Tahiti, and Hawaii.

***Actaea rufopunctata* (Milne Edwards).**

*Actaea rufopunctata* Alcock, Asiat. Soc. Bengal Journ., vol. 67, p. 142, 1898.

One specimen was taken at French Frigate Shoals and five at Wake Island. The range is from Mauritius and the Red Sea through the Indian and Pacific oceans to the Tuamotus and northward to Palmyra Island and Hawaii. It has also been reported from St. Thomas and the Cape Verde islands in the Atlantic Ocean.

***Actaea cavipes* (Dana).**

*Actaeodes cavipes* Dana, U. S. Expl. Exped., vol. 13, Crust., p. 199, 1852; pl. 11, figs. 5a and 5b, 1855.

Thirty-seven specimens were collected at Wake Island where it is apparently very common. The species has a wide range through the Indian Ocean, and localities in the Pacific from which it has been reported include Funafuti, Fiji, Samoa, the Society islands, the Tuamotus, and Palmyra Island.

**Actaea alphonsi** Nobili.

*Actaea alphonsi* A. M. Edwards, Mus. Hist. Nat., Paris, Bull., vol. 11, p. 235, 1905.

Two specimens were taken at French Frigate Shoals. Previous records of this species include the Red Sea, Hongkong, and New Guinea.

**Actaea variolosa** Borradaile.

*Actaea variolosa* Borradaile, Fauna and Geogr. Maldive and Laccadive archipelagoes, vol. 1, pt. 3, p. 256, fig. 54, 1902.

Two specimens were collected at Laysan Island. The type locality is Male Atoll, Indian Ocean.

**Etisodes caelatus** Dana.

*Etisodes caelatus* Dana, U. S. Expl. Exped., vol. 13, Crust., p. 188, 1852; pl. 9, fig. 4 a-d, 1855.

Three specimens were taken at Wake Island which was Dana's type locality. I do not know of other localities for this species.

**Etisodes electra** (Herbst).

*Etisodes electra* Alcock, Asiat. Soc. Bengal Journ., vol. 67, p. 133, 1898.

One specimen was collected at Johnston Island. The species ranges from the Red Sea through the Indian and Pacific Oceans to Australia, the Tuamotus, Palmyra Island, and Hawaii.

**Medaeus elegans** A. M. Edwards.

*Medaeus elegans* A. M. Edwards, Nouv. Arch. Mus. Hist. Nat., vol. 9, p. 211, pl. 8, fig. 1, 1873.

Three specimens were collected at Ocean Island. Edwards records the species from New Caledonia. It has been taken on the reefs of Oahu.

**Medaeus simplex** A. M. Edwards.

*Medaeus simplex* A. M. Edwards, Mus. Godeffroy, Journ., vol. 4, p. 79, 1873.

One specimen was collected at Lisiansky and two at Wake Island. Previous records of the species include Madagascar, Samoa and Hawaii.

**Medaeus ornatus** Dana.

*Medaeus ornatus* Dana, U. S. Expl. Exped., vol. 13, Crust., p. 182, 1852; pl. 9, fig. 1, 1855.

Two specimens were collected at Ocean Island. Dana's specimen was dredged at Lahaina, Maui. It has been taken on Waikiki reef, Oahu, in shallow water, and also dredged off this reef at depths ranging from 30 to 50 fathoms.

**Xanthodius biunguis** Rathbun.

*Xanthodius biunguis* Rathbun, U. S. Fish Comm. Bull., vol. 23, pt. 3, p. 849, pl. 8, fig. 10, text fig. 12, 1906.

In all 208 specimens were collected at Lisiansky, Laysan, Johnston, and Wake islands, 200 of them being taken at Johnston Island where the

species was very common in dead coral blocks and coralline algae heads, both near the shore and on the outer reef. Previous records are from Hawaii.

**Leptodius sanguineus** (Milne Edwards).

*Chlorodius sanguineus* Dana, U. S. Expl. Exped., vol. 13, Crust., p. 207, 1852; pl. 11 fig. 11 a-d, 1855.

Thirty-one specimens in all were taken at Necker, Johnston, and Wake islands, 25 of the number being collected at Wake Island. The distribution of the species is very extensive, ranging from the Red Sea through the Indian and Pacific oceans to the Liu Kiu islands, Australia, the Tuamotus, Fanning and Palmyra islands, and Hawaii. There is also a record from Marcus Island. It is exceedingly abundant on the reefs of Oahu.

**Leptodius exaratus** (Milne Edwards).

*Xantho (Leptodius) exaratus* Alcock, Asiat. Soc. Bengal Journ., vol. 67, p. 118, 1898.

Two specimens were taken at Laysan Island and 62 at Wake Island. The species ranges from the Persian Gulf through the Indian and Pacific oceans to Japan and Hawaii.

**Leptodius exaratus acutidens** Stimpson.

*Leptodius sanguineus* var. *acutidens* Stimpson, Smithsonian Miscellaneous Collections, vol. 49, No. 1717, p. 55, pl. 6, fig. 7, 1907.

Five specimens were collected at Wake Island. Stimpson reported the variety from the Liu Kiu islands. It has also been taken at Fanning and Oahu islands.

**Leptodius waialuanus** Rathbun.

*Leptodius waialuanus* Rathbun, U. S. Fish Comm. Bull., vol. 23, pt. 3, p. 848, pl. 8, fig. 9, text fig. 11, 1905.

Two specimens were collected at Ocean Island and one at Johnston Island. The type specimen was taken at Waialua, Oahu, in 1902. Several specimens are in the Bishop Museum, taken on the reefs of Oahu in recent years.

**Xantho crassimanus** A. M. Edwards.

*Xantho (Leptodius) crassimanus* Alcock, Asiat. Soc. Bengal Journ., vol. 67, p. 120, 1898.

Two specimens were collected at Necker Island. Previous records include localities in the eastern Indian Ocean, Ceylon, New Caledonia, Australia, Fanning Island, and Hawaii. Numerous specimens have been taken on Waikiki reef, Oahu.

**Lophozozymus dodone** (Herbst).

*Lophozozymus dodone* Alcock, Asiat. Soc. Bengal Journ., vol. 67, p. 108, 1898.

Twenty-eight specimens in all were collected at Pearl and Hermes Reef, French Frigate Shoals, Ocean, Lisiansky, Laysan, and Johnston islands. The species seems to range from Christmas Island, in the Indian Ocean, to Hawaii.

**Lophozozymus pulchellus** A. M. Edwards.

*Lophozozymus pulchellus* A. M. Edwards, Soc. Entom., France, Ann. (4), vol. 7, p. 273, 1867; Mus. Hist. Nat., Paris, Nouv. Arch., vol. 9, p. 205, pl. 7, fig. 3, 1873; Rathbun, Linn. Soc. Trans. 2, vol. 14, p. 214, 1910-1912.

Seven specimens in all were taken at French Frigate Shoals, Lisiansky and Laysan islands. Previous records include the Red Sea, the Seychelles and the Chagos archipelagoes in the Indian Ocean, New Caledonia, Samoa, Fanning Island and Oahu in the Pacific Ocean.

**Lophozozymus intonsus** (Randall).

*Xantho intonsus* Randall, Acad. Nat. Sci. Phila. Journ., vol. 8, p. 113, 1840.

*Lophozozymus intonsus* Rathbun, U. S. Fish Comm. Bull., vol. 23, pt. 3, p. 846, pl. 8, fig. 8, 1906.

One specimen was taken at French Frigate Shoals and one at Laysan Island. Randall described the species from Hawaii where numerous other specimens have been taken in recent years.

**Zozymus aeneus** (Linnaeus).

*Zozymus aeneus* Alcock, Asiat. Soc. Bengal Journ., vol. 67, p. 104, 1898.

Eight specimens were taken at Wake Island. The range of the species is from the Red Sea through the Indian and Pacific oceans to the Tuamotus and Hawaii, including Guam, Samoa, and Rotuma.

**Platypodia eydouxi** (A. M. Edwards).

*Lophactaea eydouxi* A. M. Edwards, Mus. Hist. Nat., Paris, Nouv. Arch., vol. 1, p. 248, pl. 16, fig. 2, 1865.

Sixty-five specimens in all were collected at Lisiansky, Laysan, and Johnston islands, of which 43 were taken at Laysan, where the species is apparently very common. Previous records of the species include the Sulu Sea, Japan, Tahiti, Palmyra Island, and Hawaii.

**Platypodia granulosa** (Rüppell).

*Lophactaea granulosa* Alcock, Asiat. Soc. Bengal Journ., vol. 67, p. 101, 1898.

Four specimens which correspond closely with descriptions of this species were collected at Wake Island. The range of the species is from Zanzibar and the Red Sea through the Indian and Pacific oceans to Fiji.

**Platypodia actoeoides** (A. M. Edwards).

*Lophactaea actoeoides* A. M. Edwards, Mus. Hist. Nat., Paris, Nouv. Arch., vol. 9, p. 189, pl. 7, fig. 7, 1873.

Eleven specimens in all were collected at Pearl and Hermes Reef, French Frigate Shoals, Ocean, Laysan and Wake islands. The type locality of the species is New Caledonia. Lenz reported the species from Laysan Island. There are two specimens in the Bishop Museum, one from the south shore of Molokai and one from Waikiki reef, Oahu, both collected in recent years.

**Liomera cinctimana** (White).

*Liomera cinctimana* Alcock, Asiat. Soc. Bengal Journ., vol. 67, p. 88, 1898.

One specimen was taken at Wake Island. The range of the species is from Mauritius and the Red Sea through the Indian and Pacific oceans to the west coast of North America. There are apparently no records for Hawaii. The Bishop Museum has specimens from the Marquesas and Palmyra Island.

**Carpilodes monticulosus** A. M. Edwards.

*Carpilodes monticulosus* Alcock, Asiat. Soc. Bengal Journ., vol. 67, p. 86, 1898.

Five specimens in all were collected at French Frigate Shoals and Wake Island. The species is known from the Indian Ocean and ranges through the Pacific to the Tuamotus and northward to Hawaii. It is very common on the reefs of Oahu, but apparently is not widely distributed among the leeward islands of the Hawaiian group.

**Carpilodes vaillantianus** (A. M. Edwards).

*Carpilodes vaillantianus* Alcock, Asiat. Soc. Bengal Journ., vol. 67, p. 85, 1898.

In all 265 specimens were collected at Pearl and Hermes Reef, French Frigate Shoals, Ocean, Lisiansky, Laysan, Johnston, and Wake islands. The species was especially abundant at Lisiansky, Laysan, Johnston, and Wake islands. The range of the species is from Mauritius and the Red Sea through the Indian and Pacific oceans to Fiji, Samoa, Palmyra Island, and Hawaii. It is very common on the reefs of Oahu.

**Carpilodes cariosus** Alcock.

*Carpilodes cariosus* Alcock, Asiat. Soc. Bengal Journ., vol. 67, p. 86, 1898.

Two specimens, conforming closely to Alcock's description of the species, were collected at Wake Island. The species has previously been reported from a number of localities in the Indian Ocean, and from Palmyra Island in the Pacific Ocean.

**Carpilodes supernodosus** Rathbun.

*Carpilodes supernodosus* Rathbun, U. S. Fish Comm. Bull., vol. 23, pt. 3, p. 844, pl. 8, fig. 5, text fig. 6, 1906.

In all 189 specimens were collected at Pearl and Hermes Reef, French Frigate Shoals, Ocean, Lisiansky, and Laysan islands. The species was especially abundant at French Frigate Shoals, Lisiansky and Laysan islands. It is apparently confined to the Hawaiian group of islands. The type locality is Laysan Island, where it was taken by the "Albatross" in 1902. It was also taken on that survey near Nihoa (Motu Manu) at depths from 27 to 31 fathoms. The species, although it has been taken on the reefs of Oahu, is not common there. From the Tanager collections it appears that the species is best developed among the leeward islands of Hawaii.

**Carpilodes pallidus** Borradaile.

*Carpilodes pallidus* Borradaile, Zool. Soc., London Proc., 1900, p. 586, pl. 40, fig. 1.

Five specimens were collected at Wake Island. Localities from which the species has previously been reported include the Chagos and Maldivé archipelagoes in the Indian Ocean, and Rotuma, Fanning, and Palmyra islands in the Pacific.

**Carpilius convexus** (Forskål).

*Carpilius convexus* Alcock, Asiat. Soc. Bengal Journ., vol. 67, p. 80, 1898.

Two specimens were collected at Johnston Island. The species ranges through the Indian and Pacific oceans from the Red Sea to the Tuamotus, Fanning and Palmyra islands and Hawaii. It is common on the reefs of Oahu.

## Family GONEPLACIDAE

**Libystes villosus** Rathbun.

*Libystes villosus* Rathbun, Biolog. Soc. of Washington Proc. vol. 37, p. 127, 1924.

One specimen was taken on the "Tanager" survey at Wake Island. Rathbun described the species from Samoa, the holotype being a female with the carapace 6.8 mm. long by 11.3 mm. wide. The Wake Island specimen, also a female, is a little smaller, having the carapace 5 mm. long by 8 mm. wide.

## Family GRAPSIDAE

**Grapsus grapsus tenuicrustatus** (Herbst).

*Grapsus maculatus* var. *tenuicrustatus* Kingsley, Acad. Nat. Sci. Phila. Proc., 1880, p. 193.

*Grapsus grapsus tenuicrustatus* Rathbun, U. S. Fish Comm. Bull., vol. 23, pt. 3, p. 838, 1906.

Fifteen specimens in all were collected at Laysan, Necker, Nihoa, Gardner, Johnston, and Wake islands. The species is known from Ceylon,

and ranges through the Pacific Ocean from the Bonin Islands to the Tuamotus, Fanning and Palmyra islands, and Hawaii.

**Grapsus strigosus** (Herbst).

*Grapsus strigosus* Alcock, Asiat. Soc. Bengal Journ., vol. 69, p. 393, 1900.

One specimen was collected at Johnston Island. The species ranges from the Red Sea through the Indian and Pacific Oceans to Hawaii, one previous record having been from Oahu. A. M. Edwards reported it from New Caledonia, and Rathbun recorded it from Tongatabu.

**Grapsus longitarsus** Dana.

*Grapsus longitarsus* Dana, U. S. Expl. Exped., vol. 13, Crust., p. 339, 1852; pl. 21, fig. 4, 1855.

One specimen was collected at Wake Island. Dana's type specimen was from the Tuamotus. Other localities from which the species has been recorded include Funafuti, Hawaii, and between the Galapagos and Manga-ruva from 300 fathoms to the surface.

**Pachygrapsus plicatus** (Milne Edwards).

*Pachygrapsus plicatus* Kingsley, Acad. Nat. Sci. Phila. Proc., 1880, p. 200.

Twenty-six specimens were collected at Johnston Island and two at Wake Island. The species has a wide range from the African coast through the Indian and Pacific oceans to the Tuamotus, Fanning and Palmyra islands, and Hawaii. There is a record from Marcus Island and Lenz reported it from Laysan Island. The Bishop Museum has specimens from Guam.

**Pachygrapsus minutus** A. M. Edwards.

*Pachygrapsus minutus* Alcock, Asiat. Soc. Bengal Journ., vol. 69, p. 399, 1900.

Thirty-three specimens in all were taken at French Frigate Shoals, Lisiansky, Laysan, and Johnston islands. The species is known from the Chagos and Mergui archipelagoes in the Indian Ocean. It apparently ranges in the Pacific from New Caledonia northward, at least to Guam and Hawaii.

**Metopograpsus messor** (Forskål).

*Metopograpsus messor* Alcock, Asiat. Soc. Bengal Journ., vol. 69, p. 397, 1900.

Twenty-one specimens were collected at Wake Island. The species ranges from the Red Sea and the African shores through the Indian and Pacific oceans at least as far as Tahiti, and northward to Hawaii, including Fanning and Palmyra islands and Hawaii. It has also been reported from the west shore of Africa. The species is not uncommon on the reefs of Oahu, although no specimens were taken on the Tanager Expedition from the leeward islands of Hawaii.

**Geograpsus grayi** (Milne Edwards).

*Geograpsus grayi* Alcock, Asiat. Soc. Bengal Journ., vol. 69, p. 395, 1900.

Five young specimens, the largest measuring 20 mm. in breadth of carapace, were taken from the rocky shores of Wake Island, and a still smaller specimen, taken on the same island at some distance from the shore, is probably of this species. The range of this species is from Madagascar and Zanzibar through the Indian and Pacific oceans to Japan, the Bonin Islands, New Caledonia, Australia, and Niue Island. It is recognized as a terrestrial form and may sometimes be found far from the ocean beach.

**Cyclograpsus audouinii** (Milne Edwards).

*Cyclograpsus audouinii* Dana, U. S. Expl. Exped., vol. 13, Crust., p. 359, 1852; pl. 23, fig. 2, 1855.

Thirty-eight specimens were collected at Wake Island. Previous localities from which the species has been reported include New Guinea, Australia, Fanning and Palmyra islands.

**Percnon planissimum** (Herbst).

*Leiolophus planissimum* Alcock, Asiat. Soc. Bengal Journ., vol. 69, p. 439, 1900.

Five specimens were collected at Wake Island. The species is widely distributed from the Red Sea through the Indian Ocean, and in the Pacific ranges from Japan to the west coasts of North and South America. It is also known in the warmer waters of the Atlantic from Brazil through the West Indies to southern Europe, and the western and southern shores of Africa. It is very common on the reefs of Oahu, but is not represented among the Tanager collections from the leeward islands of Hawaii.

**Percnon abbreviatum** (Dana).

*Acanthopus abbreviatus* Dana, U. S. Expl. Exped., vol. 13, Crust., p. 373, 1852; pl. 23, fig. 11, 1855.

Two specimens were collected at Ocean Island and eight at Wake Island. Previous records of this species include localities in the Indian Ocean, and Tahiti, Fanning Island, and Hawaii.

**Plagusia depressa tuberculata** Lamarck.

*Plagusia depressa* var. *squamosa* Alcock, Asiat. Soc. Bengal Journ., vol. 69, p. 437, 1900.

Eighteen specimens in all were collected at Lisiansky, Laysan, Gardner, and Necker islands. The species is known from the Red Sea and from Mauritius through the Indian and Pacific oceans to Hawaii.

**Planes cyaneus** Dana.

*Planes cyaneus* Dana, U. S. Expl. Exped., vol. 13, Crust., p. 347, 1852; pl. 22, fig. 1, a-g, 1855.

One specimen was collected off Laysan Island in 15 fathoms. Dana states that the species was very abundant in the Pacific, latitude 28° N., longitude 174°, on May 18, 1841, and that one specimen was taken in the South Pacific, latitude 15° 50', longitude 105°, on July 26, 1839.

## Family PALICIDAE

**Palicus tuberculatus**, new species. (Fig. 8, *c-g*; Pl. IV.)

Type specimen a female; length of carapace 9 mm., breadth 12 mm., front 4.5 mm. Type locality, Ocean Island, in shallow water on the reef.

## Bishop Museum collections No. 1134.

Carapace broader than long, dorsal surface convex in both directions, marked by elevations and ridges separated by broad, shallow grooves (Pl. IV, *A*). Three ridges cross the carapace transversely, one through the gastric region, one through the cardiac region and the third near the posterior border, those passing through the gastric and cardiac regions being subdivided medially by shallow, longitudinal furrows. The entire surface, exclusive of the grooves, is covered by closely placed tubercles of unequal size. In addition to the tubercles, the surface is densely covered by a pile of short, feathered hairs, filling the grooves and dispersed between the tubercles but not concealing the latter.

Front deflexed, border with four short, rounded teeth separated by shallow grooves, the median pair more prominent and on a lower level than the lateral ones which are removed from the tumid supraorbital borders by deep broad grooves. Supraorbital border with two fissures.

Antero-lateral border of carapace marked by five bluntly pointed teeth, inclusive of the small, outer orbital tooth. The second of the five teeth consists of a prominent tubercle somewhat more pronounced than the outer orbital tooth and separated from it by a narrow, shallow groove. Below this second tooth and separated from it by a slight depression is another tuberculate elevation of equal size. Third tooth more prominent than the second, broad and low, with a supplementary tubercle in front and behind it. The fourth tooth is the largest of the five, broadly triangular, with a tubercle in front and behind; fifth tooth is as long as the fourth but narrower. Postero-lateral border of carapace about equal in length to the antero-lateral, and irregularly tuberculate.

Eyestalk short, thick, tuberculate above, the upper base of the ocular portion and the outer half of the orbit fringed with short, stiff hairs. Suborbital border marked by two broad, deep fissures, the inner separating two prominent lobes, conspicuous from above. The pterygostomial region is marked by a broadly rounded lobe projecting ventrally.

Basal segment of antenna broadly joined to the supraorbital border excluding the flagellum from the orbit. Ischium of external maxilliped with antero-lateral border extending well beyond the articulation with the merus; merus a little longer than broad, deeply excavated for the reception of the palp.

Abdomen in type specimen (Pl. IV, *B*) of seven segments closely covered by rounded tubercles of nearly uniform size, interspersed with short hairs. The first three segments are indistinctly crested by rows of tubercles in transverse series; seventh segment triangular with tip smooth.

Under surface of carapace, external maxillipeds (fig. 8, *g*) and basal segments of antennae tuberculate, most of the tubercles being of smaller size than those of the

abdomen. Under surface everywhere is covered with a short pile similar to that of the dorsal surface.

Chelipeds (Pl. IV, C) in type specimen unequal, the right being the larger. Proximal two-thirds of lower border of arm roughened by irregularly placed tubercles. Inner angle of wrist represented by a blunt tubercle; entire outer surface of arm, wrist and palm covered with smooth, rounded tubercles of uniform size (fig. 8, e, f) between which is a dense coating of short hairs similar to that of the carapace. A prominent swelling occurs on the outer surface of the palm close to the upper border. Inner surface of palm full, smooth, with a few scattered hairs below the middle. Fingers compressed, shorter than palm, longitudinally channelled on upper and outer borders, tips pointed, crossing when closed, cutting edges thin, smooth; medial surface of fingers with rows of long, stiff bristles.

First three walking legs (Pl. IV, D) differ but slightly from each other, the first being the smallest of the three. Merus a little more than half as long, surfaces tuberculate, the posterior surface of the first and the anterior surface of the second and third legs smoother; lower border of merus roughly dentate, upper border with several blunt teeth and a rounded terminal lobe. The upper border in the first leg is smoother than that of the second and third. Upper anterior border of carpus terminating distally in a blunt tooth; upper posterior border with a longitudinal ridge, at the base of which is a row of long, feathered bristles. Propodus elongated, compressed, crested above, the posterior border of the crest with a row of long, feathered bristles; anterior and posterior surfaces of segment longitudinally channelled, the grooves filled with short hairs; lower border with a row of short spines. Dactylus compressed, with a row of long, feathered bristles near upper, posterior border and two small spines on lower border. Fourth walking leg (Pl. IV, D) very slender, roughened by irregularly placed tubercles; ischium three-fourths as long as merus and nearly as long as carpus.

A male specimen of this species taken by the Tanager Expedition at Ocean Island is slightly smaller than the type specimen, having a carapace 8 mm. in length and 10 mm. in breadth. The chelipeds in the male (Pl. IV, C) are larger than in the type specimen; the fingers, especially of the right hand, are more deflexed and the inner surface of the palm in both chelipeds is almost completely covered with a mass of long, finely branched hairs.

In addition to the two specimens collected at Ocean Island there are three other specimens in the Bishop Museum, a male and a female taken in dead coral heads on Waikiki reef, Oahu, and a female collected in shallow water on the south side of Molokai. Another specimen is in the United States National Museum, taken on the reef between Waikiki beach and Honolulu harbor by J. C. Bridwell.

This species is apparently distinguished, by important features of the carapace, chelipeds, walking legs and abdomen, from other recorded species of the Indo-Pacific area including *P. jukesii* (White) (5, p. 29, pl. 1, figs. 9-13), *P. whitei* (Miers) (22), *P. serripes* (Alcock and Anderson) (2), and from both *P. fisheri* and *P. oahuensis* described by Rathbun (23) from Hawaiian waters.

Family OCYPODIDAE

Ocypode ceratophthalma (Pallas).

*Ocypode ceratophthalma* Alcock, Asiat. Soc. Bengal Journ., vol. 69, p. 345, 1900. Sixty-six specimens in all were collected at Pearl and Hermes Reef, French Frigate Shoals, Ocean, Laysan, Nihoa, and Johnson islands. The species ranges through the Indian and Pacific oceans from Mauritius and the Red Sea to the Tuamotus and Hawaii. It is a common inhabitant of sandy beaches.

*Uca tetragonon* (Herbst).

*Gelastinus tetragonon* Alcock, Asiat. Soc. Bengal Journ., vol. 69, p. 357, 1900. Ninety specimens were collected at Wake Island. The range of the species is reported as being from Mauritius and the Red Sea through the Indian and Pacific oceans eastward to the Society islands and northward to Hawaii. Kingsley recorded the species from Hawaii, but I know of no other specimens having been taken in this locality. Conditions are not suitable for the "fiddler crab" on Johnston Island, but on Wake Island the species is very numerous on the sand flats at the eastern end of the lagoon.

Order STOMATOPODA

Family CHLORIDELIDAE

*Pseudosquilla ciliata* Miers.

*Pseudosquilla ciliata* Miers, Ann. and Mag. Nat. Hist., ser. 5, vol. 5, p. 108, pl. 3, figs. 7, 8, 1880; Kemp, Indian Mus. Mem., vol. 4, p. 96, 1913. One specimen was collected at Wake Island. Previous records indicate a wide range for the species, its description in the Indian and Pacific oceans extending from Mauritius to Hawaii. It is also known in the Atlantic from the Bahama islands, the Florida Keys and Porto Rico. It is a common species on the reefs of Oahu.

*Pseudosquilla oculata* (Brulle).

*Pseudosquilla oculata* Kemp, Indian Mus. Mem., vol. 4, p. 102, 1913. Sixty-eight adult specimens, in addition to one hundred and sixty-five larvae of the "monodactyla" stage probably of this species, were collected on the Tanager Expedition at the following localities: Pearl and Hermes Reef, French Frigate Shoals, Ocean, Lisiansky, Laysan, Johnston, and Wake islands. One hundred specimens of the larval stage were taken at night by means of a tow net near Pearl and Hermes Reef. Sixty-four similar specimens were taken in a like manner, also at night, from the surface about two miles off Johnston Island. The species has a very wide range from Mauritius through the Indian and Pacific oceans. It has also

been reported from the Atlantic in the vicinity of Madeira and the Cape Verde Islands.

*Gonodactylus chiragra* (Fabricius).

*Gonodactylus chiragra* Kemp, Indian Mus. Mem., vol. 4, p. 153, pl. 9, fig. 107, 1913. Seven specimens were collected at Wake Island. The range of the species is throughout the Indian Ocean, and in the Pacific previous records indicate its distribution from Australia to Japan and Tahiti. It has been reported from Palmyra Island, but I do not know of any records from Hawaii.

Order COPEPODA

Family CALIGIDAE

*Alelion gracilis* Wilson.

*Alelion gracilis* Wilson, U. S. Nat. Mus. Proc., vol. 31, p. 704, pl. 18, figs. 35-48, 1907.

Eight specimens were taken from a shark at French Frigate Shoals. The species is recognized as a fairly common parasite on sharks in the Atlantic Ocean, but Wilson states (27) that this is the first record of its observation in the Pacific.

Order PHYLLOPODA

Family BRANCHIPODIDAE

*Artemia gracilis* Verrill.

*Artemia gracilis* Verrill, Am. Journ. Sci., 2nd ser., vol. 48, p. 248, 1869; Packard, U. S. Geol. and Geograph. Survey of the Territories, 12th Ann. Rept., pt. 1, p. 330, Pl. 8, figs. 1-5, text figs. 17, 18, 1882.

Many thousands of specimens of an *Artemia*, which closely conforms to the description of *A. gracilis*, were taken in the lagoon at Laysan Island where they appeared to be distributed throughout its waters from the surface to the greatest depth of about 23 feet, but occurred in greater numbers in the shallows near the shore where they were crowded into dense masses. According to Packard, *A. gracilis* is widely distributed in the United States proper, ranging from Massachusetts to California. Eric Schlemmer of Honolulu, who was born on Laysan Island, states, in a personal communication, that *Artemia* was abundant in the lagoon at Laysan more than 20 years ago.

## BIBLIOGRAPHY

1. ALCOCK, A., Catalogue Indian Decapod crustaceans, pt. 2, Anomura, fasc. 1, Pagurides, 1905.
2. ALCOCK, A., Carcinological fauna of India: Asiatic Soc. Bengal, Journ., vol. 69, 1900; Illust. Zool. "Investigator," Crustacea, pl. 24, fig. 7, 1896.
3. ALCOCK, A., Carcinological fauna of India: Asiatic Soc. Bengal, Journ., vol. 68, 1889.
4. BORRADAILE, L. A., Marine crustaceans: Fauna and geography, Maldive and Laccadive archipelagoes: Linnean Soc. Trans. vol. 1, 1903.
5. CALMAN, W. T., On the Brachyura from Torres Straits: Linn. Soc. London, Zoology, vol. 8, pt. 1, 1900.
6. COUTIÈRE, H., Les Alpheidae: Soc. Philom. Paris, Bull. 9, vol. 11, no. 5, 1908.
7. COUTIÈRE, H., Fauna and geography of Maldive and Laccadive archipelagoes: Linnean Soc. Trans., vol. 2, 1906.
8. DANA, J. D., Crustacea, U. S. Explor. Exped., vol. 13, Crust. 1852; Plates, 1855.
9. DEGENER, OTTO, Description of *Dardanus sanguinocarpus*, manuscript in Bishop Museum.
10. EDMONDSON, C. H., Crustacea from Palmyra and Fanning islands: B. P. Bishop Mus. Bull. 5, 1923.
11. EDWARDS, A. M., Études Zoologiques sur Les Crustacés Récents de la Famille des Cancériens: Mus. Hist. Nat. Paris, Nouv. Arch., vol. 1, pp. 177-308, pls. 15, figs. 2, 2a, 2b; pl. 16, fig. 6, 1865.
12. EDWARDS, A. M., and BOUVIER, E. L. (Reports on the results of dredging of the U. S. Coast Survey Steamer "Blake"), Description des Crustacés de la Famille des Paguriens recueillis pendant l'Expédition: Mus. Comp. Zool. Harvard, Mem., vol. 14, no. 3, 1893.
- 12a. EDWARDS, A. M., and BOUVIER, E. L., . . . Soc. Zool. France, vol. 22, p. 133, 1897.
13. EDWARDS, HENRI MILNE, Histoire naturelle des Crustacés, vol. 2, Paris, 1837.
14. FREYCINET, LOUIS DE, Voyage autour du monde . . . Zoology, 1824.
15. GARDINER, J. STANLEY, Fauna and geography Maldive and Laccadive archipelagoes, vol. 2, 1906.
16. GREGORY, HERBERT E., Report of the Director for the year 1923: B. P. Bishop Mus. Bull. 10, 1924.
17. HELLER, C., Crustaceen-Fauna des rothen Meeres: Sitzber. Akad. Wien, vol. 43 (1), p. 366, pl. 2, figs. 33-39, 1861; vol. 44, 1, p. 272, pl. 63, figs. 21 and 22, 1862.
18. HENDERSON, J. R., On a new species of coral-infesting crab taken by the R. I. M. S. "Investigator" at the Andaman Islands: Ann. Mag. Nat. Hist., ser. 7, vol. 18, p. 211, pl. 8, 1906.
19. LENZ, H., Ergebnisse einer Reise nach dem Pacific (Schauinsland 1806-1807).
20. MAN, J. G. DE, Decapoden and Stomatopoden . . . : Arch. für Naturgesch., vol. 53, 1, 1887.
21. MAN, J. G. DE, Decapoda of the Siboga Expedition, pt. 2, Alpheidae, 1911.
22. MIERS, E. J., Collections from the Western Indian Ocean, Crustacea. Report of the voyage "Alert," p. 551, pl. 49, fig. c, 1884.
23. RATHBUN, MARY J., The Brachyura and Macrura of the Hawaiian islands: U. S. Fish Comm. Bull. for 1903, vol. 23, pt. 3, p. 835, 1906.

24. SMITH, S. I., Preliminary report on the Brachyura and Anomura dredged in deep water off the south coast of New Zealand: U. S. Fish Comm. Bull., 1880, 1881, and 1882.
25. SMITH, S. I., Preliminary report on the Brachyura and Anomura . . . : U. S. Nat. Mus. Proc., vol. 6, p. 37, pl. 5, figs. 2, 2a; pl. 6, figs. 5-8, 1883.
26. VERRILL, A. E., Decapod Crustacea of Bermuda: Conn. Acad. Arts and Sciences, Trans. vol. 13, p. 427, pl. 28, fig. 8, text figs. 48, 49a, b, c, 1908.
27. WILSON, C. B., Personal communication.



*A*



*D*



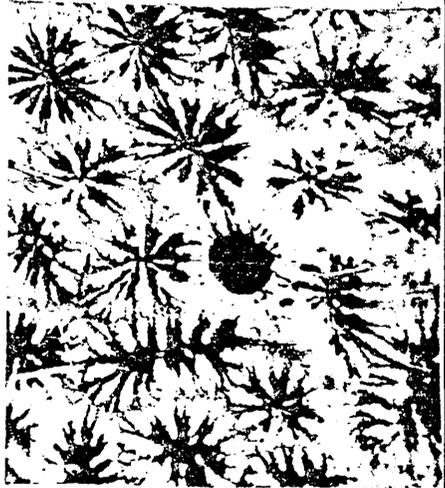
*B*



*E*

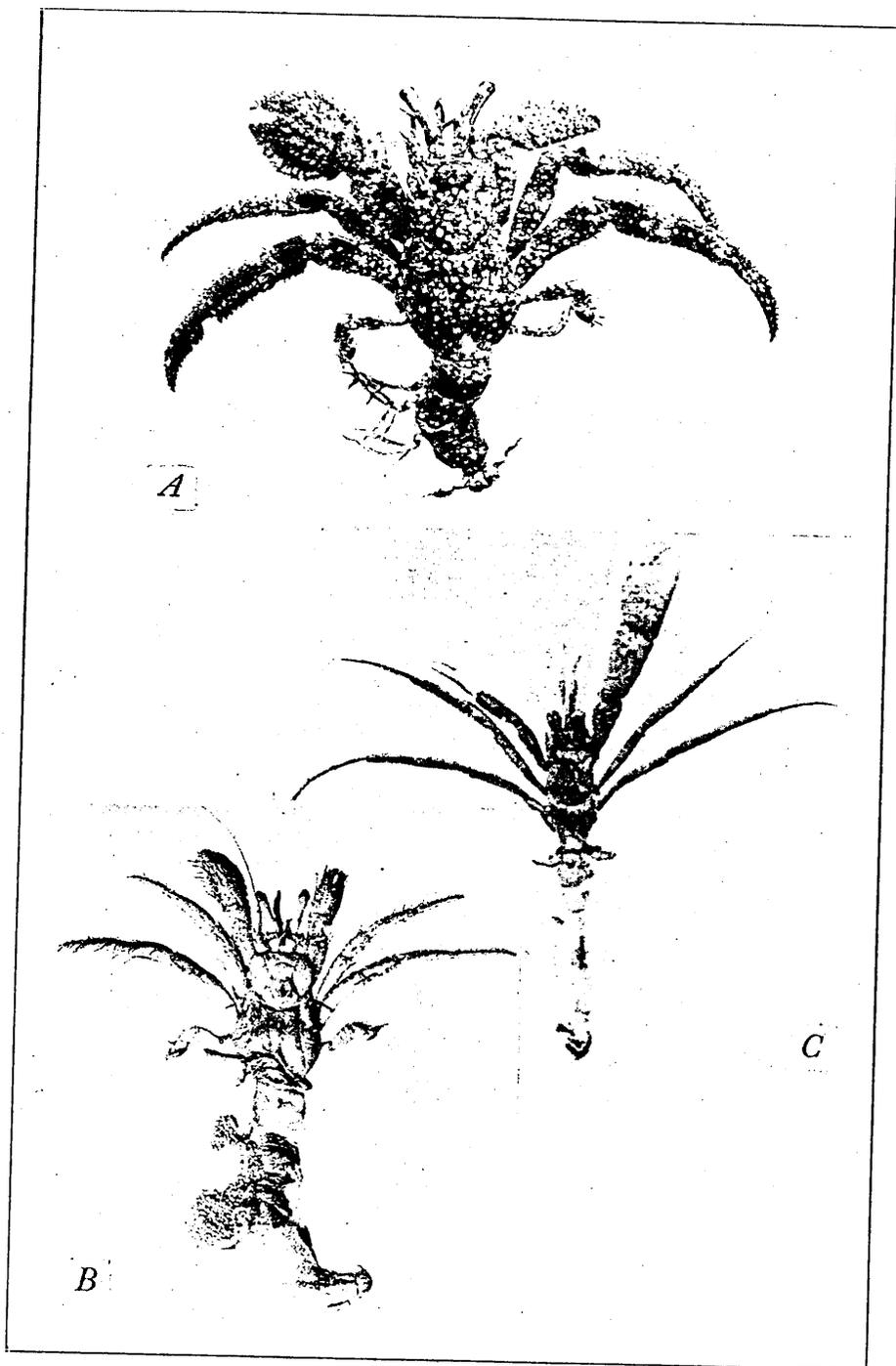


*C*

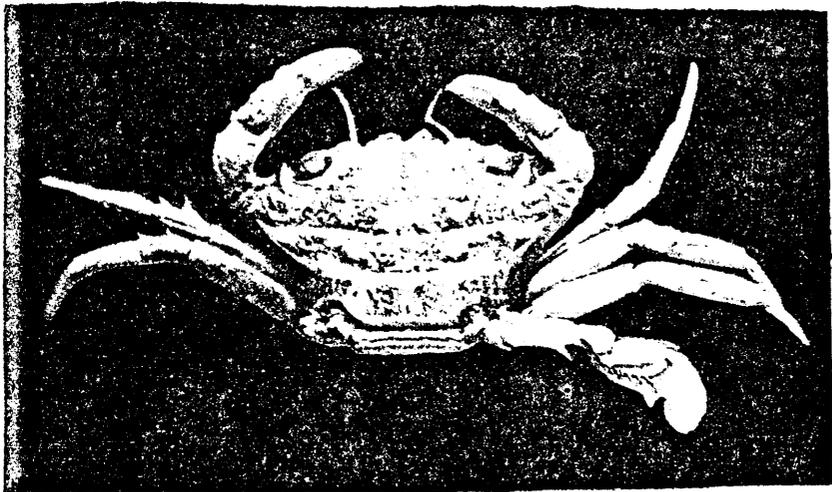


*F*

*A*, ANXIOPSIS (PARANXIOPSIS) JOHNSTONI, HOLOTYPE; *B*, CRYPTOCHIRUS CRESCENTUS, TYPE SPECIMEN; *C*, PIT IN CORAL. PAVONA DUERDENI, INHABITED BY CRYPTOCHIRUS CRESCENTUS; *D*, CRYPTOCHIRUS CORALLIODYTES HELLER, WAKE ISLAND SPECIMEN, DORSAL VIEW; *E*, CRYPTOCHIRUS CORALLIODYTES HELLER, WAKE ISLAND SPECIMEN, SIDE VIEW; *F*, PIT IN CORAL INHABITED BY CRYPTOCHIRUS CORALLIODYTES HELLER, WAKE ISLAND SPECIMEN.



*A*, *DARDANUS SANGUINOCARPUS*, TYPE SPECIMEN; *B*, *DARDANUS SULCATUS*, HOLOTYPE; *C*, *SYMPAGURUS PACIFICUS*, HOLOTYPE.



A



B

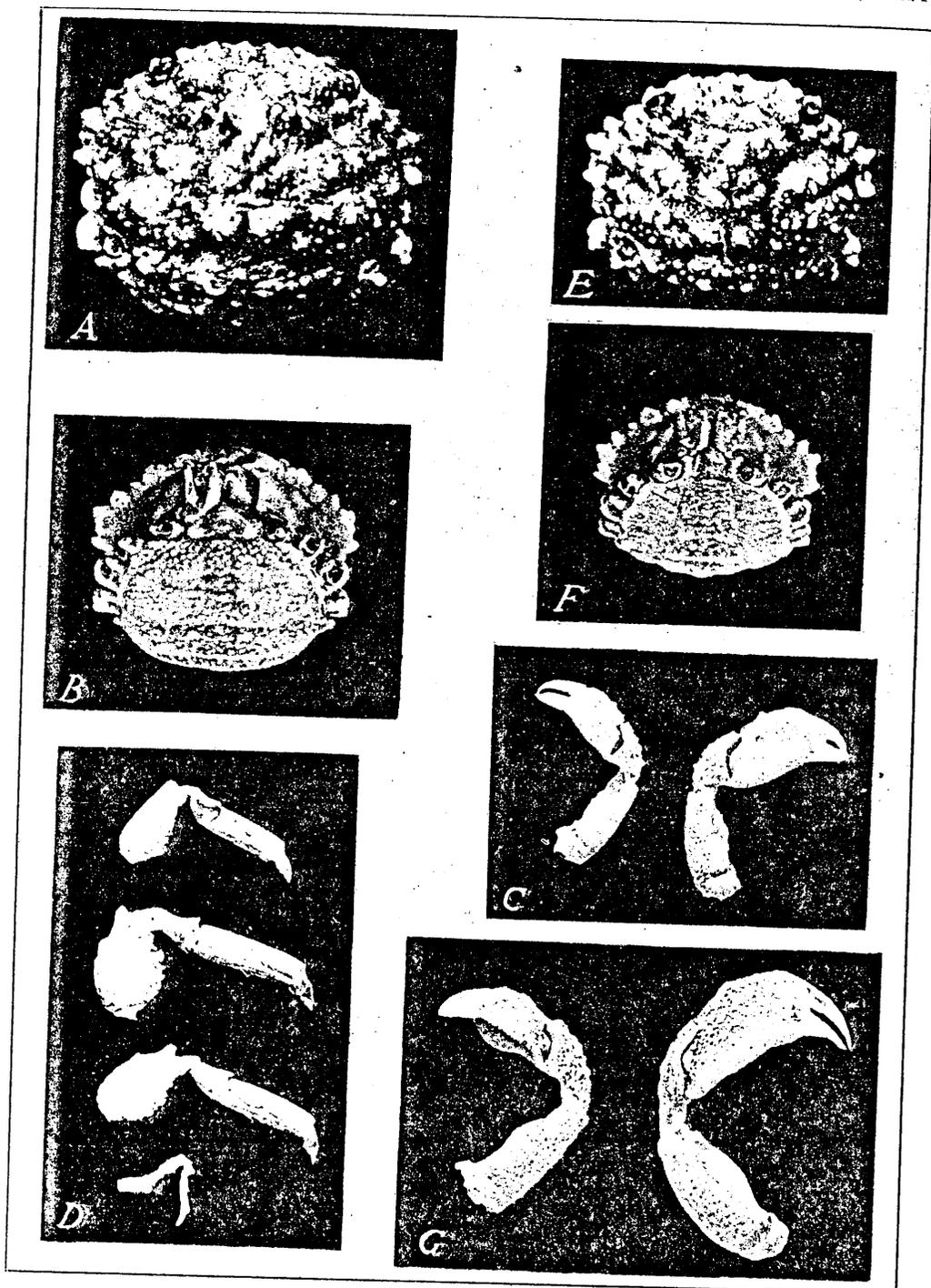


C



D

A, *THALAMITA WAKENSIS*, HOLOTYPE; B, *EUXANTHUS MINUTUS*, TYPE SPECIMEN, C, *CHLORODIELLA ASPER*, TYPE SPECIMEN (♀); D, *CHLORODIELLA ASPER* (♂).



*A*, *PALICUS TUBERCULATUS*, TYPE SPECIMEN, DORSAL SURFACE OF CARAPACE; *B*, VENTRAL SURFACE OF SAME; *C*, *PALICUS TUBERCULATUS*, TYPE SPECIMEN, CHELIPEDS; *D*, *PALICUS TUBERCULATUS*, TYPE SPECIMEN, FOUR WALKING LEGS; *E*, *PALICUS TUBERCULATUS* ( $\delta$ ), DORSAL SURFACE OF CARAPACE; *F*, VENTRAL SURFACE OF SAME; *G*, *PALICUS TUBERCULATUS* ( $\delta$ ), CHELIPEDS.