CRUSTACEA FROM PALMYRA AND FANNING ISLANDS

BY

CHARLES HOWARD EDMONDSON

WITH

DESCRIPTIONS OF NEW SPECIES OF CRABS FROM PALMYRA ISLAND

BY MARY J. RATHBUN

BERNICE P. BISHOP MUSEUM

BULLETIN 5

WITH 2 PLATES

HONOLULU, HAWAII

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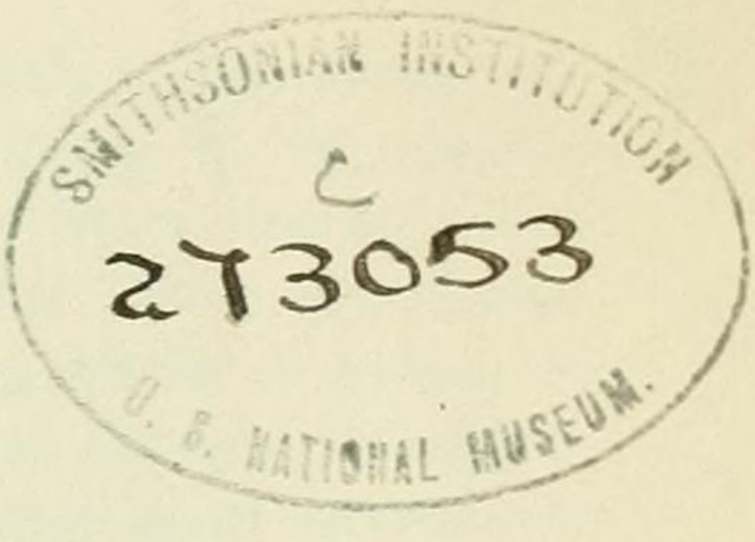

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INTRODUCTION

From a geographical point of view the atolls of Palmyra and Fanning in the north equatorial region of the Pacific Ocean belong to the same group of islands, a group which also includes Washington and Christmas Islands in addition to Kingman Reef. This short chain of atolls with a northwest-southeast trend is somewhat parallel with the Hawaiian Group but about one thousand miles south of the latter and in close proximity to the equator.

Of the four main islands Palmyra is the most northern and western with a position of 5° 49′ 4″ N. Lat. and approximately 162° 11′ 30″ W. Long., and Christmas Island is the most eastern and also nearest the equator, being 1° 57′ N. Lat. and 157° 27′ W. Long. Fanning Island lies about 145 miles northwest of Christmas Island in latitude 3° 51′ 25″, and 66 miles northwest of Fanning is Washington Island with Palmyra 126 miles to the northwest of it. Kingman Reef, of coral formation and very small area exposed above the surface of the ocean, is about 40 miles north of Palmyra.

Although Fanning Island was discovered in 1798 and Palmyra Island in 1802 very little reliable information regarding either of them was available until recent times, and it has only been within the past few years that efforts have been made to carry out comprehensive scientific investigations of these typically mid-Pacific atolls.

The earliest contribution to the biology of the islands of this group was made in 1877[1] based on material collected by Dr. Thomas H. Streets and Dr. William H. Jones, surgeons in the United States Navy, during a survey of the islands of the North Pacific by the United States ship Portsmouth in 1873-74. This systematic report includes 13 species of plants, 13 of birds, 36 of fishes and 10 of crustaceans collected at Palmyra, Washington, Fanning and Christmas Islands. That a larger collection of invertebrate fauna was made at this time is indicated by Dr. Streets when he says[2] "Excepting the crustaceans, the invertebrate portion of the collection is excluded from this bulletin."

[1] Streets, Thomas H., Contributions to the natural history of the Hawaiian and Fanning Islands and Lower California: Bull. U. S. Nat. Mus., No. 7, 1877.

[2] Op. cit., footnote, p. 7.

Another publication having reference to the natural history of this group of islands was issued by Emmanuel Rougier in 1914 under the title "Ile Christmas, South Seas",[3] This booklet of 158 pages includes a discussion of the topography, climate and natural resources of the island, and a considerable amount of information regarding its flora and fauna.

In July 1913 a party from Honolulu, including Hon. Henry E. Cooper, the owner of Palmyra Island, Dr. C. M. Cooke, Jr., conchologist of the Bishop Museum, and Professor Joseph F. Rock, botanist of the College of Hawaii, proceeded to Palmyra with the purpose in view of exploring the atoll and investigating the fauna and flora found on and about the numerous islets of the group.

As a result of this expedition a large amount of biological material was collected and turned over to the Bishop Museum, and Professor Rock, in co-operation with other botanists, published a paper entitled "Palmyra Island with a description of its flora".[4] In this account brief historical and general descriptions of Palmyra are followed by a systematic discussion of the flora of the atoll. The paper is well illustrated with numerous photographs taken by the author and is accompanied by a chart, revised from two older ones, of the entire group of islets forming the atoll as it was observed by members of the expedition of 1913.

In the paper by Professor Rock, which is primarily a botanical report, some reference is also made to the animal life of Palmyra. The fauna of the shallow water about the islands is mentioned in a very general way and more specific, but brief, consideration is given to birds, insects and land crustaceans.

More recently, in a publication entitled "Some shoal-water corals from Murray Island (Australia), Cocos-Kneeling Islands, and Fanning Island",[5] T. W. Vaughan gives consideration to 26 species and 1 variety of corals collected at Fanning Island, and points out the importance of this locality as a connecting link in the distribution of corals between regions south of the equator and Hawaii.

The four papers cited above are, so far as I have been able to discover, the only ones published having direct reference to the natural history of this group of atolls.

An additional lot of crustaceans have recently been presented to the Bishop Museum by Dr. H. E. Lyon, botanist of the Hawaiian Sugar Planters' Association. These specimens, chiefly amphipods and isopods, saved from marine algae collected by Professor Rock at Palmyra Island

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[3] Rougier, Emmanuel, Ile Christmas, South Seas, Brioude, France, L. Watel, 1914.
[4] College of Hawaii, Bull. No. 4, 1916.
[5] Papers from the Department of Marine Biology of the Carnegie Institution of Washington, vol. 9, pp. 49-234, 74 pls. and 2 figs. 1918.

in 1913 and turned over to Dr. Lyon for identification, have been tentatively placed in genera by Mr. Clarence R. Shoemaker of the United States National Museum prior to a more complete determination, and are so listed in the present paper. It is hoped that a more complete report may be made upon these forms at some future time.

More recent collections of marine fauna were taken at Palmyra Island by Mr. L. A. Thurston and Mr. D. Thaanum of Honolulu during the early summer of 1922. A considerable amount of material from this expedition, including fishes, crustaceans, echinoderms, mollusks, and other forms of marine life was received by the Bishop Museum. The crustaceans in this lot are included in the present report.

Fanning Island was discovered by Captain Edmund Fanning in 1798[6] and, although the island has been for many years an industrial and commercial center of some importance, very little has been reported about its flora and fauna.

In July 1922 the Bishop Museum commissioned me to make a biological survey of Fanning Island with S. C. Ball, Curator of Collections. During July and August we spent ten days on the island, making as complete biological investigations and as representative collections of land and marine flora and fauna as time permitted.

The island is of the atoll type with a lagoon about 9 miles in length and approximately one-half that breadth with the long diameter in a northwest-southeast direction. The land rim surrounding the lagoon averages about half a mile wide with a maximum elevation of less than 10 feet. The lagoon, in depth, ranges down to nearly 60 feet, although it is very shallow over much of its area. It is well filled with coral much of which, especially near the west shore, has apparently recently died. Plate I, *B* shows a typical section of the beach of the lagoon, and Plate II. *B* one of the numerous tide-flats. (See also fig. 1.)

On the outer or ocean side of the land area a narrow, rocky shelf, doubtless one time a living coral reef, extends about the western and southern shores. This shelf is well exposed in many places at low tide and is more or less completely covered by thin slabs of limestone of coral formation, worn smooth by the action of water and laid down in shingled layers. (See Pl. II, *A*). The slope from the shelf to deep water is gradual making possible safe anchorage for ships at a considerable distance from the shore.

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[6] Fanning, Edmund, Voyages Round the World, with selected sketches of voyages to the South Seas, North and South Pacific Oceans, China, . . . , chapter 12. New York, Collins and Hannay, 1833.

There are three breaks in the land rim which connects the lagoon with the sea—the north and south canoe passages, both of which are very shallow, and a much wider and deeper channel on the southwest side which is navigable for vessels of light draft. (See Pl. I, *A*). The lagoon shore is, in most places, a narrow, sandy beach.

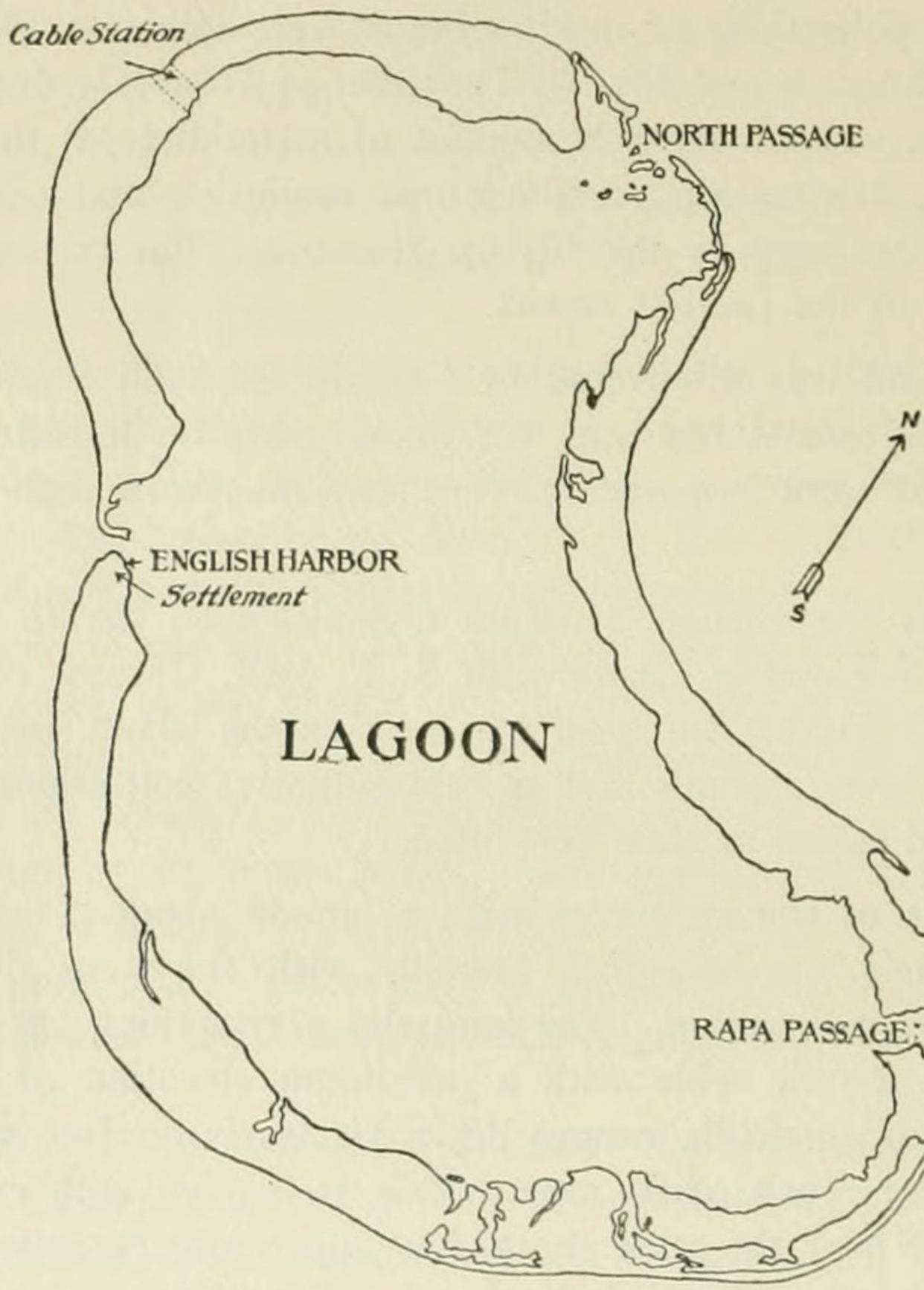


FIGURE 1. Outline map of Fanning Island, based on a survey by Clarence A. Brown. The length of the lagoon is approximately 9 miles.

The island is now occupied by the Fanning Island Limited—an English copra company—and by a cable station of the Pacific Cable Board, the station being an important relay on the cable line between Sydney and Bamfield, B. C. Acknowledgment is hereby made of the courtesy and generosity of the managements of these two establishments through whose assistance the survey was made possible.

During the survey of Fanning Island general collection of plants and animals were made on the land, the outer shore, and in the lagoon. The paucity of seaweeds in the waters about the island was very noticeable. A few small varieties of filamentous algae attached and free-floating seemed

to be the only representatives of the group. Both the outer shore and the lagoon were found to be rich in invertebrate fauna, especially of the echinoderm, molluscan and crustacean phyla and many species of each of these were taken. This paper deals only with the crustaceans.

The surface waters of the lagoon were found to be teeming with entomostracan crustaceans, larvae of mollusks, crabs, and such like which no doubt serve as food for the numerous fishes. Determination of the species of the tow material collected has been made only in part and few forms from that source are included in the list which follows.

Although by no means an exhaustive one, and very limited in respect to certain groups, the systematic record following may be considered fairly representative of the crustacean fauna of atolls of the mid-Pacific region. The data relative to the distribution of the species is sufficient to disclose the very extensive range of many of the forms taken at Palmyra and Fanning Islands. A similarity of the crustacean fauna of the Indian Ocean to that of these two islands is obvious. It will also be noted that many species are common to Fanning and Palmyra Islands and Hawaii.

The Indo-Pacific crustacean fauna has clearly extended eastward in the Pacific as far as the Marquesas and the Tuamotus and some species have reached Easter Island. Its influence also includes the Hawaiian Group and a few species have apparently reached the American coast and more that of Japan, while a few other species, having even a wider distribution, are included in the fauna of the warmer waters of the Atlantic as well as that of the Indian and Pacific Oceans. It is also evident, so far as our present knowledge goes, that Palmyra and Fanning islands mark the northern distributional limit in the mid-Pacific region of certain Indo-Pacific species.

In addition to previous acknowledgments credit is due Drs. Mary J. Rathbun and Waldo L. Schmitt of the United States National Museum for services rendered in the identification of certain species included in this paper. Rathbun also described two new species of crabs from Palmyra Island. (See p. 38.) For the outline drawing of Fanning Island (fig. 1) and for three photographs Plate I, *A, B,* and Plate II, *B* I am endebted to Mr. Clarence Brown, a civil engineer of Honolulu who completed a topographical survey of the atoll in 1919.

The systematic report is based upon approximately 800 specimens collected at Palmyra Island in 1913 by C. Montague Cooke, Jr. and Joseph F. Rock; 190 specimens taken by Messrs. Lorrin Thurston and David Thaanum at the same island in 1922, and 800 specimens collected at Fanning Island by Stanley C. Ball and me in 1922.

TAXONOMY

Order DECAPODA

Suborder REPTANTIA

Tribe BRACHYURA

Family OCYPODIDAE

Ocypode ceratophthalma (Pallas).

Ocypode ceratophthalma Alcock, Journ. Asiat. Soc. Bengal, vol. 69, p. 345, 1900.

The species ranges from Mauritius through the Indian Ocean to India, and in the Pacific from the Philippines and Murray Inland, Australia, eastward as far as the Tuamotus and northward to Hawaii. It was previously reported by Streets from the Fanning Group. Fifteen specimens were taken at Palmyra and 3 at Fanning Island. The species is common on the sandy beaches facing the open ocean or lagoons.

Uca tetragonon (Herbst).

Gelasimus tetragonon Alcock, Journ. Asiat. Soc. Bengal, vol. 69, p. 357, 1900.

The range of the species is from Mauritius to the Red Sea, through the Indian Ocean to Torres Straits and through the Pacific eastward to the Society Islands and northward as far as Hawaii. Forty-seven specimens were collected at Palmyra Island.

Uca annulipes (Milne Edwards).

Gelasimus annulipes Alcock, Journ. Asiat. Soc. Bengal, vol. 69, p. 353, 1900.

The species is widely distributed, ranging from Zanzibar through the Indian and Pacific Oceans to the coasts of South America, Lower California, and Vancouver. No records are known for Hawaii. Eight specimens were collected at Palmyra and 51 from Fanning Island. It is very common on Fanning, burrowing in the mud flats near the Cable Station and elsewhere. Judging from the collections made at Palmyra it would seem that this species is not so common as the preceding one on that island.

Family GECARCINIDAE

Cardisoma rotundum (Quoy and Gaimard).

Cardisoma hirtipes Dana, U. S. Expl. Exped., vol. 13, Crust., p. 376, 1852; pl. 24, fig. 2, 1855.

The species is known from Madagascar, Farquhar Atoll, and numerous other localities in the Indian Ocean. In the Pacific it ranges from the Liu Kiu Islands eastward to Guam, Fiji, Auckland, Tahiti, and Hawaii. Three specimens were taken at Palmyra and 1 at Fanning Island.

Cardisoma carnifex (Herbst).

Cardisoma carnifex Alcock, Journ. Asiat. Soc. Bengal, vol. 69, p. 455, 1900.

The species is known from Madagascar throughout the Indian Ocean to the Andamans and Pondicherry. Its range through the Pacific is eastward to the Society Islands and the Tuamotus. Streets previously reported the species from the Fanning Group. Palmyra probably represents the northern limit of its distribution. The species does not inhabit Hawaii. In the Bishop Museum are 2 specimens from Palmyra and 16 from Fanning Island. This burrowing land crab is very abundant on both of these islands. Although the species functions as a scavenger it has become very obnoxious to the human inhabitants of Fanning Island by reason of its numbers and habits.

Family GRAPSIDAE

Grapsus grapsus tenuicrustatus (Herbst).

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

Records of the species are from Ceylon, the Bonin Islands, Marcus Island, Guam, the Tuamotus and Hawaii. Streets recorded it from the Fanning Group as *Grapsus rudis* Milne. Edwards. According to Rathbun[7] the subspecies is characteristic of the islands of the Pacific while the species *Grapsus grapsus* (Linnaeus) is confined to the continental border of America. Six specimens were taken at Palmyra and 16 at Fanning Island.

[7] Bull. U. S. Fish Comm., vol. 23, pt. 3, p. 838, 1906.

Geograpsus crinipes (Dana).

Geograpsus crinipes Alcock, Journ. Asiat. Soc. Bengal, vol. 69, p. 396, 1900.

The species is well known through the central and eastern sections of the Indian Ocean, and also from the Caroline and Marshall Islands, from Funafuti, the Tuamotus, Tahiti and northward to Hawaii and Marcus Island. Streets previously reported it from the Fanning Group. It is commonly found on rocky shore lines where it is associated with the preceding subspecies within the common range. Eight specimens were collected at Palmyra and 7 at Fanning Island.

Pachygrapsus plicatus (Milne Edwards).

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

The species is known from the southeastern coast of Africa, the Chagos Archipelago, the Liu Kiu Islands, New Caledonia, the Caroline Islands and eastward to the Paumotus and northward to Hawaii and Marcus Island. One specimen was taken at Palmyra and 1 at Fanning Island.

Pachygrapsus minutus A. M. Edwards.

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

Previous records of the species are from the Chagos and Mergui Archipelagoes, New Caledonia, the Caroline Islands, Fiji and Hawaii. Twenty specimens were taken at Palmyra and 3 at Fanning Island.

Metopograpsus messor (Forskal).

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

The species ranges from the African coast and the Red Sea through the Indian and Pacific Oceans to Fiji, Samoa, Tahiti, and Hawaii. It is common in Hawaii. It has also been recorded from the west shore of Africa. Seven specimens were collected at Fanning Island.

Cyclograpsus audouinii (Milne Edwards).

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

Edwards lists the species from New Guinea. Dana was in doubt about the locality of his material as he says "Fiji Islands or New Zealand, probably the latter." Stimpson records it from Port Jackson, Australia.

Two specimens were taken at Palmyra and 5 at Fanning Island.

Pseudograpsus albus Stimpson.

Pseudograpsus albus Stimpson, Proc. Acad. Nat. Sci. Phila., 1858, p. 104.

The species has previously been recorded from Japanese waters by Stimpson, from New Caledonia by A. M. Edwards, and from the Tuamotus by Rathbun. The "Challenger" Expedition collected the species at Fiji.

Nineteen specimens were collected at Palmyra and 12 at Fanning Island.

Percnon planissimum (Herbst).

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

The species is widely distributed throughout the Indo-Pacific area and ranges from Japan to the coasts of California, Chili and New Zealand. It is very common in Hawaii. In the Atlantic it ranges from the shores of Brazil through the West Indies to Florida, the Azores, Madeira, Spain, Portugal and to the western and southern coasts of Africa. Eight specimens were taken at Palmyra and 2 at Fanning Island.

Percnon abbreviatum (Dana).

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

Previous records of the species include localities in the Indian Ocean, Tahiti and Hawaii. It is not uncommon on the reefs of Oahu. One specimen was collected at Fanning Island.

Family PILUMNIDAE

Carpilius convexus (Forskal).

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

The species is widely distributed, ranging from the Red Sea through the Indian and Pacific Oceans to the shores of Japan and eastward to Hawaii and the Tuamotus. One specimen was taken at Palmyra and 1 at Fanning Island.

Carpilius maculatus (Linnaeus).

Carpilius maculatus Alcock, Journ. Asiat. Soc. Bengal, vol. 67, p. 79, 1898.

The species ranges from Madagascar and Mauritius through the Indian and Pacific Oceans to Japan and Hawaii and eastward to Tahiti and the Tuamotus. One specimen was collected at Fanning Island.

Carpilodes monticulosus A. M. Edwards.

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

The species is known from the Indian Ocean and ranges through the Pacific to the Tuamotus and to Hawaii where it is very common.

One speciment was taken at Fanning Island.

Carpilodes pallidus Borradaile.

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

Previous records are from the Chagos and Maldive Archipelagoes in the Indian Ocean and Rotuma in the Pacific. Four specimens were collected at Palmyra and 3 at Fanning Island.

Carpilodes viallantinus (A. M. Edwards).

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

The species ranges from Mauritius through the Indian Ocean and is known in the Pacific from Fiji, Samoa and Hawaii. Eleven specimens were collected at Palmyra Island.

Carpilodes cariosus Alcock.

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

The species is recorded by Alcock from off Ceylon in 26½-34 fathoms, and off Andamans in 10-15 fathoms. Rathbun reports it from Salomon and Amirante Islands and other localities in the western Indian Ocean at depths down to 80 fathoms. Borradaile records the species from the Maldive Archipelago at depths from 20-40 fathoms. Calman reports it from Christmas Island in the Indian Ocean. Two specimens collected at Palmyra Island, one by C. Montague Cooke in 1913 and one by Mr. L. A. Thurston in 1922, correspond very closely both in structural features and coloration with Alcock's description of this species. From previously reported localities, the normal habitat of the species would seem, however, to be at somewhat greater depths than the shallow water of the reef from which the Palmyra specimens were taken.

Liomera cinctimana (White).

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

The species ranges from Mauritius through the Indian and Pacific Oceans to the west coast of North America. No records are known for Hawaii. There is one specimen in the Bishop Museum from Palmyra Island.

Platypodia eydouxi (A. M. Edwards).

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

The species is apparently distributed from the Sulu Sea and the coast of Japan through the Pacific to Tahiti, including Hawaii where is is common. Two specimens were taken at Palmyra Island.

Platypodia digitalis Rathbun.

Platypodia digitalis Rathbun, Mem. Mus. Comp. Zool., vol. 35, p. 38, pl. 1, fig. 6: pl. 9, figs. 4, 4a, 1907.

Previous records of the species include the Caroline Islands and Tahiti. One specimen was collected at Palmyra Island.

Platypodia fissa (Henderson).

Lophactaea fissa Henderson, Trans. Linn. Soc. Zoology, Vol. 5, p. 355, pl. 36, figs. 8, 8a, 1893.

The type is recorded from Tuticorin, Bay of Bengal, by Henderson. Alcock[8] says "It appears to me possible that this, which seems to be founded on a single specimen, is only an individual variation of *Lophactaea granulosa*."

After carefully comparing the specimen in the Bishop Museum with Henderson's description and figure, I am inclined, however, to believe that his species is a good one. One specimen was collected at Palmyra Island.

Lophozozymus pulchellus A. M. Edwards.

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

Rathbun records the species from the Seychelles and the Chagos Archipelago in the Indian Ocean. It probably occurs in many localities in the Pacific. There are two specimens in the Bishop Museum from Hawaii. One specimen was collected at Fanning Island.

Xantho crassimanus A. M. Edwards.

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

Localities from which the species has previously been reported include the Andamans, Karáchi, Ceylon and Hawaii. There is a specimen in the Bishop Museum from Australia which has a carapace 46 mm. in breadth. Smaller specimens have frequently been taken on Waikiki reef, Oahu. Two specimens were collected at Fanning Island.

[8] Journ. Assiat. Soc. Bengal, vol. 67, p. 103, 1898.

Leptodius sanguineus (Milne Edwards).

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

The species ranges from the Chagos Archipelago and the Persian Gulf through the Indian and Pacific Oceans to the Liu Kiu Islands and eastward to the Tuamotus including Marcus Island and Hawaii.

It is very abundant on the reefs of Oahu, Hawaii. Eleven specimens were collected at Palmyra and 86 at Fanning Island.

Leptodius gracilis (Dana).

Chlorodius gracilis Dana, U. S. Expl. Exped., vol. 13, Crust., p. 210, 1852; pl. 11, fig. 13, 1855.

Previous records of the species include the Chagos Archipelago, Hong Kong, Japan, the Caroline Islands, Wake Island and Hawaii. Five specimens were collected at Palmyra and 3 at Fanning Island.

Leptodius nudipes (Dana).

Xantho (*Leptodius*) *nudipes* Alcock, Journ Asiat. Soc. Bengal, vol. 67, p. 121, 1898.

The species has previously been recorded from the western Indian Ocean, from the Andamans, the Mergui Archipelago and from Hawaii. One specimen was collected at Palmyra Island.

Leptodius exaratus acutidens Stimpson.

Leptodius exaratus var. *acutidens* Stimpson, Smithsonian Miscell. Coll., vol. 49, p. 55, pl. 6, fig. 7, 1907.

The type locality is the Liu Kiu Islands. It has frequently been taken on Waikiki reef, Oahu. One specimen was collected at Fanning Island.

Leptodius molokaiensis Rathbun.

Leptodius molokaiensis Rathbun, Bull. U. S. Fish Comm., vol. 23, pt. 3, p. 847, pl. 9, fig. 1 and text-fig. 10, 1906.

Rathbun has recorded the species from off the coast of Molokai of the Hawaiian Group, which is the type locality, and from Salomon and Amirante Islands in the Indian Ocean. I have not found published reports of the species from other localities. It has been taken, however, on Waikiki reef, Honolulu. One specimen was collected at Palmyra and 1 at Fanning Island. These are both large, well developed specimens with the specific characteristics clearly marked.

Etisodes electra (Herbst).

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

The species is known from Mauritius, the Seychelles, the Chagos Archipelago and the Red Sea eastward through the Indian Ocean, and in the Pacific from Murray Island, Australia, to the Tuamotus and northward to Hawaii. Five specimens were collected at Palmyra Island.

Actaea affinis (Dana).

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

The species is known from the Chagos Archipelago and the Nicobars but is apparently not widely distributed through the Indian Ocean. In the Pacific there are records from the Philippines, Japan, Rotuma, the Society Islands, the Tuamotus and Hawaii. It is very common in Hawaii. Six specimens were collected at Palmyra and 37 at Fanning Island.

Actaea rufopunctata (Milne Edwards).

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

The species ranges from Mauritius and the Red Sea through the Indian and Pacific Oceans to China, Fiji, Funafuti, Tahiti, the Tuamotus and Hawaii. It is also known from the Mediterranean, the Canaries, Madeira, and the South Atlantic.

Two specimens were collected at Palmyra Island.

Actaea hirsutissima (Rüppell).

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

The species is distributed through the Indian Ocean and into the Pacific to Japan, northeast Australia, Samoa, Tahiti and Hawaii. Three specimens were taken at Palmyra Island.

Actaea ruppellii (Krauss).

Actaea ruppellii Alcock, Journ. Asiat. Soc. Bengal, vol. 67, p. 144, 1898.

The species is widely distributed through the Indian Ocean and has also been reported from the Malay Archipelago and from north and northeast Australia. One specimen was collected at Palmyra Island.

Actaea speciosa (Dana).

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

The species is distributed from the Persian Gulf and the Central Indian Ocean to Ceylon and is also known from Guam, Samoa, Funafuti and northward to Hawaii. Four specimens were collected at Palmyra Island.

Actaea garretti Rathbun.

Actaea garretti Rathbun, Bull. U. S. Fish. Comm., vol. 23, pt. 3, p. 852, pl. 9, fig. 8, 1906.

Previous records of the species are from such widely separated regions as Mauritius, the Chagos Archipelago, Kingsmill Islands, the Society Islands and Hawaii.

One specimen was taken at Palmyra Island.

Actaea cavipes (Dana).

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

The species is known from Mauritius and the Chagos Archipelago to the Persian Gulf and eastward to India. Records in the Pacific include Funafuti, Fiji, Samoa, the Society Islands and the Tuamotus. Five specimens were collected at Palmyra Island.

Daira perlata (Herbst).

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

The species is known from Mauritius, Christmas Island, the Chagos Archipelago and through the Indo-Pacific region to the Liu Kiu Islands and eastward to Samoa and Tahiti. No records are known for Hawaii. Five specimens were collected at Palmyra and 3 at Fanning Island.

Xanthias lamarckii (Milne Edwards).

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

The range of the species in the Indian Ocean is from Madagascar and Mauritius to Ceylon. Localities in the Pacific from which it has been reported include the Philippines, Torres Straits, Funafuti, Samoa, the Society Islands and the Tuamotus. No record is known for Hawaii.

One specimen was taken at Palmyra and 27 at Fanning Island.

Lioxantho tumidus Alcock.

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

The species has been reported by Alcock from the Andamans and Samoa. One specimen was collected at Fanning Island.

Micropanope sexlobata Rathbun.

Micropanope sexlobata Rathbun, Bull. U. S. Fish Comm., vol. 23, pt. 3, p. 856, pl. 9, fig. 13, 1906.

The species has been reported by Rathbun from the type locality in the vicinity of Laysan Island. Three specimens were taken at Palmyra Island.

Chlorodiella niger (Forskal).

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

The species ranges from Christmas Island, the Seychelles and the Red Sea through the Indian Ocean and is also known from the Liu Kiu and Caroline Islands, Torres Straits, Australia, Lord Howe Island, Funafuti, Fiji, the Society Islands, the Tuamotus and northward to Hawaii and Wake Island.

Thirty-five specimens were taken at Palmyra and 36 at Fanning Island.

Phymodius nitidus (Dana).

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

The species has been reported from the Indian Ocean, from Samoa, and from Hawaii where it is very common. Twelve specimens were collected at Palmyra and 3 at Fanning Island.

Phymodius ungulatus (Milne Edwards).

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

The species ranges through the Indian and Pacific Oceans from Mauritius to the Tuamotus and Hawaii. Twenty-one specimens were collected at Palmyra Island.

Chlorodopsis scabriculus (Dana).

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

The species has been reported from Coetivy, Indian Ocean, the Balibac Passage, Tahiti, the Tuamotus and Hawaii. Ten specimens were taken at Palmyra and 3 at Fanning Island.

Cymo quadrilobatus Miers.

Cymo quadrilobatus Alcock, Journ. Asiat. Soc. Bengal, vol. 67, p. 175, 1898.

The species is known from the Chagos Archipelago, Little Andaman, Palk Strait and Funafuti. No records are known for Hawaii. Five specimens were collected at Palmyra Island.

Cymo melanodactylus De Haan.

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

The species is apparently widely distributed through the central and eastern sections of the Indian Ocean and eastward to China, Japan and the Bonin Islands. It is also known from Australia, Fiji, the Society Islands and the Tuamotus. No records are from Hawaii. One specimen was collected at Palmyra and 2 at Fanning Island. At Fanning the species is associated with dead coral in the lagoon.

Cymo andreossyi (Audouin).

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

The species has a very wide distribution through the Indian and Pacific Oceans. In the Pacific it is known from the shores of Japan eastward to Tahiti. No records are from Hawaii. Twenty-one specimens were collected at Palmyra Island.

Pseudozius caystrus (Adams and White).

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

The species ranges from the Red Sea through the eastern Indian Ocean and is also known from the Philippines, Samoa, the Tuamotus and Wake Island. It has not been recorded from Hawaii. Fifty-nine specimens were taken at Palmyra and 74 at Fanning Island. At Fanning it is one of the most common species under the stones in shallow water, both in the lagoon and on the outer reef.

Pseudozius inornatus Dana.

Pseudozius inornatus Dana, U. S. Expl. Exped., vol. 13, Crust., p. 234, 1852; pl. 13, figs. 7a-7c, 1855.

The species has previously been reported from Hawaii. Eighty-six specimens were taken at Fanning Island.

Lydia annulipes (Milne Edwards).

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

The species is recorded by Alcock from Muscat and Samoa, and from Hawaii by Rathbun. There is a specimen in the Bishop Museum from Marcus Island obtained by W. A. Bryan. Stimpson reports it from the Liu Kiu Islands. Eight specimens were taken at Palmyra and 6 at Fanning Island.

Pilumnus andersoni de Man.

Pilumnus andersoni de Man, Journ. Linn. Soc., Zool., vol. 22, p. 59, pl. 3, figs. 5 and 6, 1888.

The species has a very extensive range from the western Indian Ocean to near Laysan Island in the North Pacific. Recorded localities in this range are Minikoi, Maldive Archipelago, Karachi, Ceylon, Mergui Archipelago, Gasper Strait, the Caroline Islands and Funafuti. Twelve specimens were collected at Fanning Island.

Maldivia palmyrensis Rathbun (New species).[9]

Type locality, Palmyra Island. Collected by C. Montague Cooke Jr. in 1913. Type specimen, Bishop Museum, No. 312.

Eriphia sebana (Shaw).

Eriphia laevimana Alcock, Journ, Asiat. Soc. Bengal, vol. 67, p. 214, 1898.

The species ranges from the east coast of Africa and Mauritius through the Indian and Pacific Oceans to China and Japan, and from Australia northward to Hawaii and eastward to the Tuamotus.

Two specimens were taken at Palmyra and 13 at Fanning Island. On the outer reef of Fanning this species is one of the most common of the larger crabs found in the holes in the rocks in shallow water.

Eriphia scabricula Dana.

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

The species ranges through the Indian Ocean to Ceylon and the Sulu Sea, and from Australia through the Pacific to the Society Islands and the Tuamotus. One specimen was collected at Palmyra and 44 at Fanning Island. The species is very common at Fanning on the outer reef under the flat stones in shallow water. It is much smaller than *E. sebana*.

[9] Described by Mary J. Rathbun on p. 38 of this Bulletin.

Trapezia cymodoce (Herbst).

Trapezia cymodoce Alcock, Journ, Asiat. Soc. Bengal, vol. 67, p. 219, 1898.

The species is widely distributed throughout the Indian and Pacific Oceans wherever there are coral reefs, ranging northward in the Pacific to Hawaii. With other species of the genus it is associated with living coral. Thirty-five specimens were collected at Palmyra Island. No collections of animals associated with living coral were made at Fanning Island. Hence there are in the Bishop Museum no representatives of Trapezia from Fanning.

Trapezia cymodoce ferruginea (Latreille).

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

The range of the species is from the Chagos Archipelago, the Seychelles and the Red Sea to Ceylon and through the Pacific to Hawaii, the Tuamotus and Easter Island. It is also known from the shores of Mexico and Panama Bay. It is associated with living coral. One hundred and two specimens were collected at Palmyra Island.

Trapezia cymodoce intermedia Miers.

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

Previous records are from the Chagos Archipelago, from off the coast of Burma, and from Hawaii where it is very common, associated with the corals, *Pocillopora ligulata* Dana, and *Pocillopora meandrina* var. *nobilis*, Verrill. Four specimens were collected at Palmyra Island.

Trapezia rufopunctata (Herbst).

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

The range of the species is from the Red Sea, the Amirante Islands and the Chagos Archipelago through the Indian and Pacific Oceans to the Tuamotus and to Hawaii. It is associated with *T. ferruginea*. Eight specimens are in the Bishop Museum from Palmyra Island.

Trapezia digitalis (Latreille).

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

Previous records of the species are from Mauritius, Christmas Island, the Chagos Archipelago and the Red Sea, also from localities in the eastern Indian Ocean, from Palk Strait, Ceylon, Funafuti and Hawaii. It is also known from Cape St. Lucas, Mexico and Panama Bay. In Hawaii

it is very common, being associated with corals of the genus Pocillopora. Thirty-nine specimens were collected at Palmyra Island.

Tetralia glaberrima (Herbst).

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

The species ranges through the Indian Ocean and is known from Hong Kong eastward through the Pacific to the Society Islands, the Tuamotus and the Marquesas. No records are known for Hawaii. Forty-four specimens were taken at Palmyra Island.

Domecia hispida Eydoux and Souleyet.

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

The species is reported from the central and eastern sections of the Indian Ocean, and from Funafuti, Tahiti, the Tuamotus and Hawaii as far north as Laysan Island. It is also known from the West Indies. The Bishop Museum has 33 specimens from Palmyra Island.

Lybia tesselata (Latreille).

Melia tesselata Borradaile, Fauna and Geogr. Maldive and Laccadive Archipelagoes, vol. 1, p. 250, fig. 49, 1903.

The species is known from Mauritius, Christmas Island, the Chagos Archipelago and the eastern Indian Ocean. Recorded localities in the Pacific are not numerous. Its northern limit of distribution seems to be Hawaii where it has frequently been taken. The species usually carries a sea anemone in one or both chelipeds. Thirteen specimens were collected at Palmyra and 5 at Fanning Island.

Family PORTUNIDAE

Lissocarcinus orbicularis Dana.

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

The species is known from the Indian Ocean and from Fiji and Hawaii in the Pacific. Two specimens were collected on the outer reef at Fanning Island.

Carupa laeviuscula Heller.

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

The range of the species is from Mauritius through the Indian Ocean, and from Samoa northward as far as Laysan Island, and eastward to the

Tuamotus. It is not uncommon on Waikiki reef, Honolulu. One specimen was collected at Fanning Island.

Portunus pubescens (Dana).

Lupa pubescena Dana, U. S. Expl. Exped., vol. 13, Crust., p. 274, 1852; pl. 16, fig. 9, 1855.

The previous records are from Hawaii where it is a fairly common form. One specimen was collected at Palmyra Island.

Portunus (Achelous) granulatus (A. M. Edwards).

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

The species is widely distributed, ranging from east Africa and the Red Sea through the Indian and Pacific Oceans to New Caledonia and Japan and eastward to Fiji, the Society Islands and the Tuamotus and northward to Hawaii as far as Laysan Island. It was previously reported by Streets from the Fanning Group.

One specimen was collected at Palmyra Island in 1922.

Charybdis (Charybdis) cookei Rathbun (new species).[10]

Type locality, Palmyra Island. Collected by C. Montague Cooke Jr. in 1913. Type specimen in the Bishop Museum, No. 983.

Thalamita edwardsi Borradaile.

Thalamita edwardsi Borradaile, Proc. Zool. Soc., London, 1900, p. 579; Fauna and Geogr. Maldive and Laccadive Archipelagoes, vol. 1, p. 202, 1902: Rathbun, Bull. U. S. Fish Comm., vol. 23, pt. 3, p. 873, 1906.

The species is known from the Indian Ocean, from Funafuti and from Hawaii. It is very abundant in shallow water on the reefs of Oahu. One specimen was collected at Palmyra Island.

Thalamita auauensis Rathbun.

Thalamita auauensis Rathbun, Bull. U. S. Fish Comm., vol. 23, pt. 3, p. 847, 1906.

The previous record of the species is from Hawaii.

Seven specimens corresponding very closely to this species were taken at Palmyra Island.

[10] Described by Mary J. Rathbun on page 39.

Thalamita cooperi Borradaile.

Thalamita cooperi Borradaile, Fauna and Geogr. Maldive and Laccadive Archipelagoes, vol. 1, p. 206, text fig. 37, 1903.

The species has previously been recorded from the Amirante Islands, Goidu, Hulule and Minikoi—atolls in the Indian Ocean. One specimen was collected at Palmyra Island.

Thalamita prymna Milne Edwards.

Thalamita prymna Milne Edwards, Hist. Nat. des Crust., vol. 1, p. 461, 1837: Streets, Bull. U. S. Nat. Mus., No. 7, p. 108, 1877

The species has been recorded from localities in the Indian Ocean, the East Indies, the Philippines, Australia, Lord Howe Island, the Liu Kiu Islands, Japan, Tongatabu and Palmyra, the latter locality being reported by Streets.

The species was not taken by the expeditions of 1913 and 1922, but is listed here in consideration of Streets' previous record.

Assecla holothuricola Streets.

Assecla holothuricola Streets, Bull. U. S. Nat. Mus., No. 7, p. 111, 1877.

The type locality, as reported by Streets, is Palmyra Island where it was taken from the digestive tract of a holothurian. No specimens were collected by the expedition of 1913 and 1922 but the species is listed here in consideration of Streets' record.

Podophthalmus vigil (Fabricius).

Podophthalmus vigil Miers, Voyage of the Challenger, vol. 17, Brachyura, p. 207, 1886.

According to Miers the species is distributed throughout the Indo-Pacific region. It was reported from the Fanning Group by Streets. No specimens were collected by the expedition of 1913 and 1922 but the species is listed here in consideration of Streets' previous record.

Family INACHIDAE

Menaethius monoceros (Latreille).

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

The species has a wide distribution ranging from the east coast of Africa and the Red Sea through the Indian and Pacific Oceans to New Caledonia, northeast Australia, Lord Howe Island, Japan, Samoa, Tonga-

tabu, the Tuamotus and northward to Hawaii. One specimen was collected at Fanning Island.

Family **CALAPPIDAE**

Calappa spinosissima Milne Edwards.

Calappa spinosissima Alcock, Journ. Asiat. Soc. Bengal, vol. 65, p. 144, 1896.

The previous records are from the Indian Ocean. Two specimens were collected at Palmyra Island.

Family **LEUCOSIIDAE**

Nucia speciosa Dana.

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

The previous record of the species is from Hawaii. It has frequently been taken on Waikiki reef, Honolulu.

One specimen was collected at Fanning Island.

Family **HAPALOCARCINIDAE**

Hapalocarcinus marsupialis Stimpson.

Hapalocarcinus marsupialus Stimpson, Proc. Boston Soc. Nat. Hist., vol. 6, p. 412, 1856-58: Calman, Trans. Linn. Soc., Zoology, vol. 8, p. 43, 1900: Potts, Papers from Dept. marine Biology of the Carnegie Institution of Washington, vol. 8, p. 35, 1915.[11]

The species is known from the Indian Ocean, Torres Straits and generally through the Pacific northward to Hawaii where it is very abundant. It was first described by Stimpson from Hilo, Hawaii. The female crab forms galls on certain species of corals of the genera Pocillopora, Seriatopora, Stylophora, Sideropora and Millepora. Calman states that coral galls, possibly due to this species, have also been reported from the Red Sea, Ceylon and the China Sea. Two specimens were collected at Palmyra Island.

Tribe ANOMURA

Family **PORCELLANIDAE**

Petrolisthes speciosa (Dana).

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

The recorded range of the species seems to be from Balabac Straits through the Pacific to Hong Kong, Japan, the Bonin Islands and eastward

[11] The paper by Potts includes investigations on the development, life history and habits of this gall-forming species.

to Wake Island, the Kingsmill Group and the Tuamotus. Bryan reports a variety of the species from Marcus Island. It has also been recorded from West Africa. No records are known for Hawaii.

Five specimens were taken at Palmyra and 70 at Fanning Island where the species is very abundant under the stones at the shore line on the outer reef.

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.

The species has been reported from the Maldive Archipelago and Minikoi in the Indian Ocean and from a number of localities in the Pacific including New Caledonia, Rotuma, Fiji, Funafuti, Samoa, Hawaii, and from Charles Island of the Galapagos. Five specimens were collected at Palmyra and 1 at Fanning Island.

Family COENOBITIDAE

Coenobita oliviera Owen.

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

The localities from which the species has previously been reported include Madras, the Nicobars, Funafuti, the Society Islands, the Tuamotus and Fanning Island, Streets recorded the species from Fanning. Bryan collected the species at Marcus Island. No records are from Hawaii. This large land hermit commonly inhabits the shells of species of Turbo. Twenty-nine specimens were collected at Palmyra and 3 at Fanning Island by the expedition of 1913 and 1922.

Coenobita brevimanus Dana.

Coenobita clypeata var. *brevimanus* Dana, U. S. Expl. Exped., vol. 13, Crust., p. 473, 1852; pl. 30, fig. 4b, 1855.

The species is recorded by Dana from Balabac Passage. On Palmyra and Fanning Islands it has the habits of C. oliviera, but is much less numerous. Ten specimens were collected at Palmyra and 3 at Fanning Island.

Coenobita rugosa Milne Edwards.

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

The species has a wide distribution in the Indian Ocean and is known from the Malay Archipelago and the Sulu Sea eastward to New Caledonia,

the Bonin Islands, Rotuma, Fiji, Funafuti, Samoa and the Tuamotus. Its range does not include Hawaii. Nineteen specimens were collected at Palmyra and 74 at Fanning Island. The species is the most common of all the hermit crabs on Fanning Island where it may be found in great numbers on the ocean beaches just above the high tide line. It inhabits the shells of many species of mollusks.

Family PAGURIDAE

Clibanarius corallinus (Milne Edwards).

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

The species is known from the Andamans, the Nicobars, the Malay Archipelago and ranges from the Liu Kiu Islands eastward to Wake Island, Rotuma, Fiji, Funafuti and Tahiti. Ten specimens were taken at Fanning Island in shallow water on the outer reef.

Calcinus herbstii de Man.

Calcinus tibicen Dana, U. S. Expl. Exped., vol. 13, Crust., p. 457, 1852.
Calcinus herbstii Alcock, Cat. Indian Decapod Crust., pt. 2, fasc. 1, p. 53, pl. 5, fig. 4, 1905.

Previous records of the species are from numerous localities in the Indian Ocean, from Balabac Straits, Liu Kiu Islands, Japan, Bonin Islands, Wake Island, Samoa, Funafuti, the Society Islands, the Tuamotus and Hawaii. It is also known from Ecuador and the West Indies. The species is the most common of the hermit crabs on the reefs of Oahu, Hawaii. Thirty-six specimens were collected at Fanning Island.

Calcinus elegans (Milne Edwards).

Calcinus elegans Dana, U. S. Expl. Exped., vol. 13, Crust., p. 458, 1852; pl. 28, fig. 10 a-c, 1855: Alcock, Cat. Indian Decapod Crust., pt. 2, fasc. 1, p. 55, pl. 5, fig. 2, 1905.

The species has a range extending from the east coast of Africa through the Indian and Pacific Oceans to Hawaii. One specimen was collected at Palmyra and 5 at Fanning Island.

Calcinus latens Randall.

Calcinus latens, Dana, U. S. Expl. Exped., vol. 13, Crust., p. 459, 1852; pl. 28, fig. 11, 1855: Alcock, Cat. Indian Decapod, Crust., pt. 2, fasc. 1, p. 58, pl. 5, fig. 5, 1905.

The range of the species is from the east coast of Africa and the Red Sea through the Indian Ocean. Records are from the Liu Kiu Islands,

and from Australia northward through the Pacific as far as Laysan Island. Three specimens were taken at Palmyra Island.

Calcinus terrae-reginae Haswell.

Calcinus terrae-reginae Haswell, Proc. Linn, Soc. N. S. W., vol. 6, p. 760, 1881-82; Alcock, Cat. Indian Decapod Crust., pt. 2, fasc. 1, p. 57, pl. 5, fig. 7, 1905.

The previous records of the species include the Maldive Archipelago, Minikoi, the Mergui Archipelago, and Queensland. Three specimens were collected at Palmyra Island.

Pagurus punctulatus Olivier.

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

The species has a wide distribution ranging from the east coast of Africa and the Red Sea through the Indian Ocean, and in the Pacific from the Liu Kiu Islands and Australia to Hawaii. Four specimens were collected at Palmyra Island.

Birgus latro Leach.

Birgus latro Dana, U. S. Expl. Exped., vol. 13, Crust., p. 474, 1852; pl. 30, figs. 5a and 5b, 1855.

The "coconut crab" ranges from Mauritius through the Indian Ocean to the islands of the Pacific where it is widely dispersed. Among localities in the Pacific from which it has previously been reported are New Caledonia, Guam, Fiji, Funafuti, the Tuamotus, the Marquesas, Washington, and Fanning Islands. The species does not inhabit Hawaii. Streets reported it from the Fanning group. In addition to two specimens from Palmyra Island there are specimens in the Bishop Museum from Guam, the Marquesas and Fanning Island. On Fanning the species is becoming depleted as it is highly prized as an article of food by the Gilbertese laborers.

Family AXIIDAE

Axius serratifrons A. M. Edwards.

Axius serratifrons A. M. Edwards, Journ. Mus. Godeffroy, Heft iv, 3, p. 87, Taf. 2, fig. 6 (p. 263, Taf. 13), 1873.

The species is recorded by Edwards from Upolu, Samoa, and from Hawaii. One specimen was collected at Fanning Island on the outer reef.

Tribe PALINURA

Family SCYLLARIDAE

Parabacus antarcticus (Lund).

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

Previous records of the species include New Caledonia, the Loyalty Islands, Samoa and Hawaii. One small specimen was collected at Palmyra Island.

Suborder NATANTIA

Tribe CARIDES

Family CRANGONIDAE

Crangon obesomanus (Dana).

Alpheus obesomanus Dana, U. S. Expl. Exped., vol. 13, Crust., p. 547, 1852; pl. 34, fig. 7 a-f, 1855.

Dana records the species from Fiji. It has also been reported from Madagascar, the Seychelles, New Britain, and the Loyalty Islands. Two specimens were collected at Palmyra Island.

Crangon paradentipes (Coutière).

Alpheus paradentipes Coutière, Fauna and Geogr. Maldive and Laccadive Archipelagoes, vol. 2, p. 880, pl. 74, fig. 17, 1906.

The species has previously been recorded from the Maldive Archipelago. One specimen was collected at Palmyra Island.

Crangon collumianus (Stimpson).

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

The species has been recorded from the Maldive and Laccadive Archipelagoes, New Caledonia, the Bonin Islands, Japan, Murray Island, and Funafuti. Six specimens were collected at Palmyra Island.

Crangon macrochirus (Richters).

Alpheus macrochirus Richters, Meeresfauna Ins. Mauritius, p. 164, pl. 17, 1880.

The species is well distributed from Madagascar and Mauritius through the Indian Ocean. There are also records from Rotuma, Tahiti and the Gulf of California. There is one specimen in the Bishop Museum taken

at Palmyra Island which, in the opinion of Dr. Waldo L. Schmitt, is probably of this species.

Crangon ventrosus (Milne Edwards).

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

This species is the most common and most widely distributed of the genus having a general range, according to Coutière, from Madagascar to the Red Sea, eastward to the Philippines, through the Pacific to the Society Islands and northward to Hawaii and the Gulf of California. Twenty-seven specimens were collected at Palmyra Island.

Crangon pachychirus (Stimpson).

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

The species is known from the Maldive and Laccadive Archipelagoes, the Liu Kiu Islands and Rotuma. Three specimens were collected at Palmyra Island.

Crangon bucephalus (Coutière).

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

Previous records are from Mahé, Jibouti, Maldive Archipelago, Minikoi, Balabac Straits and off Manila. One specimen was collected at Palmyra Island.

Crangon paracrinitus (Miers).

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

The species has been reported from Senegambia and Jibouti. Four specimens were taken at Palmyra Island.

Crangon paracrinitus (Miers) var. near var. **bengalensis** (Coutière).

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

The var. *bengalensis* of Coutière with which, according to Dr. Waldo L. Schmitt, the Palmyra variety is a close affinity, has been recorded from Minikoi in the Indian Ocean. One specimen was collected at Palmyra Island.

Synalpheus paroneomeris Coutière.

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

Previous records are from Mahé, Muscat, Jibouti, the Maldive Archipelago, and Minikoi. Two specimens were collected at Palmyra Island.

Family HIPPOLYTIDAE

Saron marmorata (Olivier).

Saron marmorata Kemp, Rec. Indian Museum, vol. 10, p. 84, 1914.

The species is widely distributed ranging from the east coast of Africa and the Red Sea through the Indian Ocean and the Pacific Ocean eastward to Tahiti and northward to Hawaii. Two specimens were taken at Palmyra Island.

Family GNATHOPHYLLIDAE

Gnathophyllum fasciolatum Stimpson.

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

The type locality of the species is recorded at Port Jackson, Australia. The species has also been reported from Hawaii. Two specimens were collected at Palmyra Island in 1922.

Family HYMENOCERIDAE

Hymenocera elegans Heller. (figs. 2; 3, **a-f**).

Hymenocera elegans Heller, Verh. zool. botan. Ges. Wien., Br. 11, p. 25, 1861; Sitz. Ber. Acad. Wiss. Wien., 44, 1, p. 264, pl. 3, figs. 9-14, 1861.

The species has been recorded from the Red Sea, which is the type locality, and from Mauritius, Mozambique, Matema Island, and the Seychelles in the Indian Ocean. It has more recently been reported by de Man[12] in material from the "Siboga" Expedition. I have not had access to de Man's article and am in doubt as to the locality from which the author reports the species.

Three specimens, all females, of a form which, except in certain details noted below, corresponds very closely with Heller's description of *Hymenocera elegans,* were collected at Palmyra Island in 1922. Although there may be specific differences regarding features not mentioned in the description of the type specimen, I am retaining the Palmyra Island form, temporarily at least, within this species.

[12] (Results Explor. "Siboga" 39a3, p. 191).

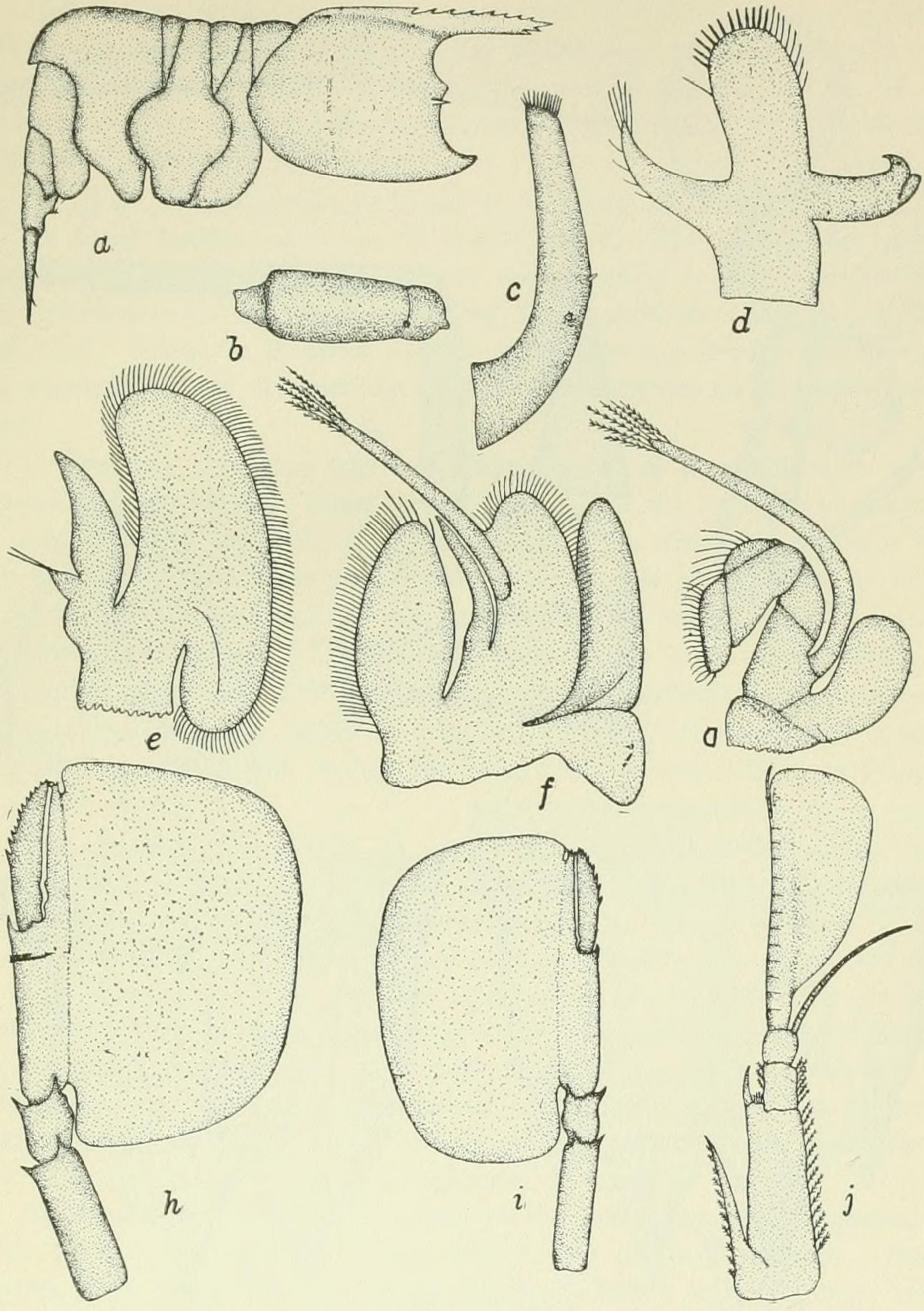
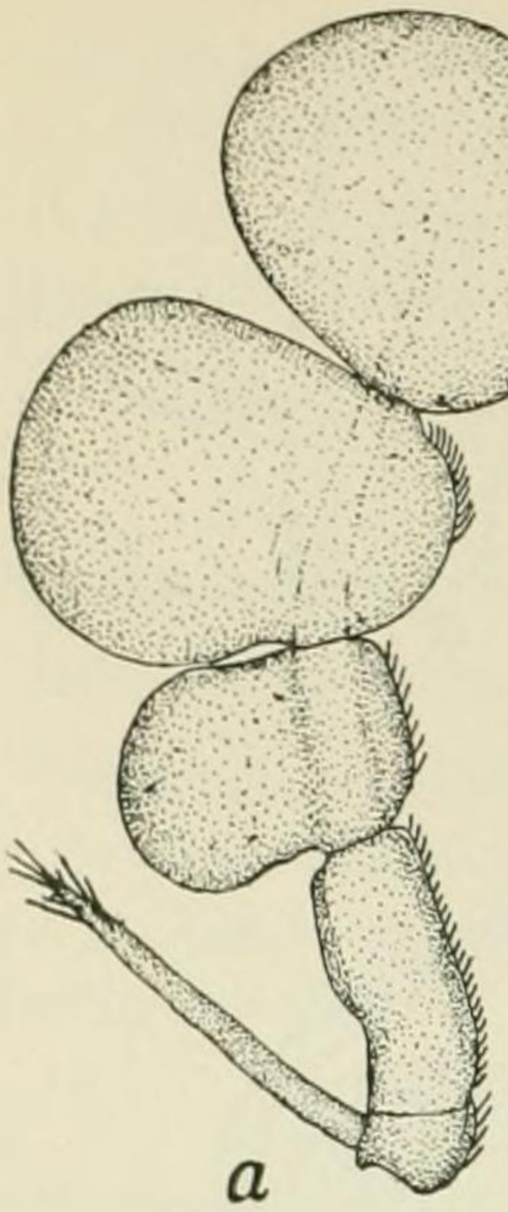


FIGURE 2. Camera lucida drawings of structural features of *Hymenocera elegans* Heller; *a*, lateral view of carapace and abdomen × 2; *b*, eye-stalk × 8; *c*, mandible with rudimentary palp × 27; *d*, first maxilla × 15; *e*, second maxilla × 13; *f*, first maxilliped × 16; *g*, second maxilliped × 16; *h*, second walking leg of left side × 4; *i*, second walking leg of right side × 4; *j*, antennule of left side × 5.



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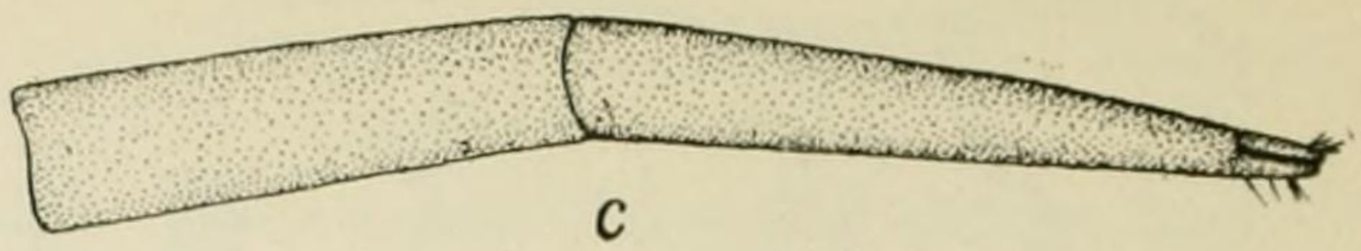

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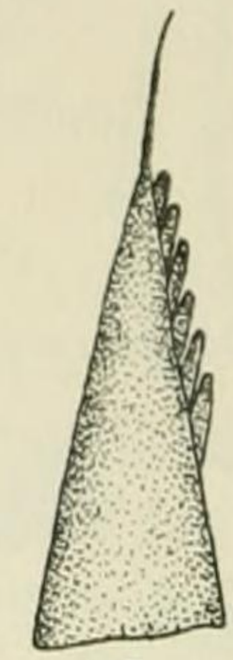

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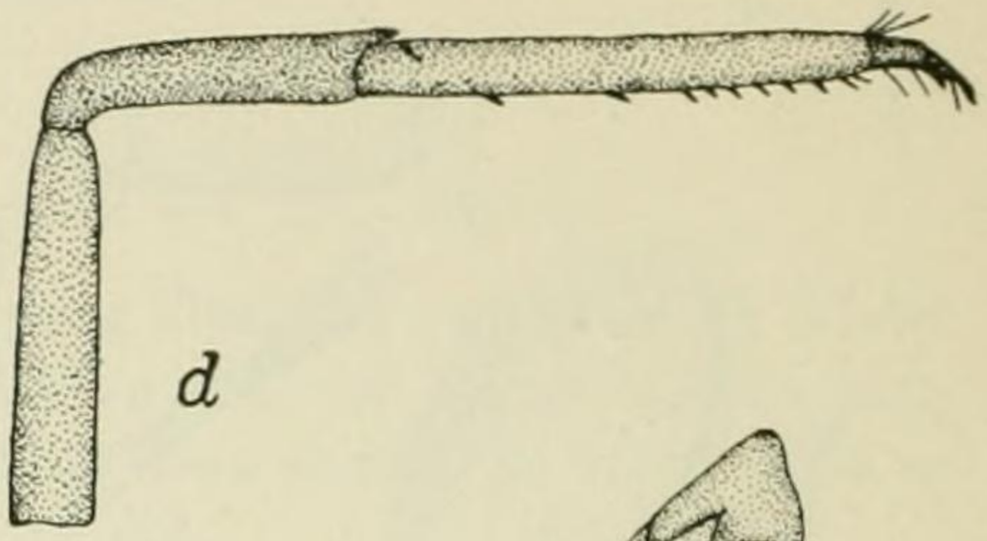

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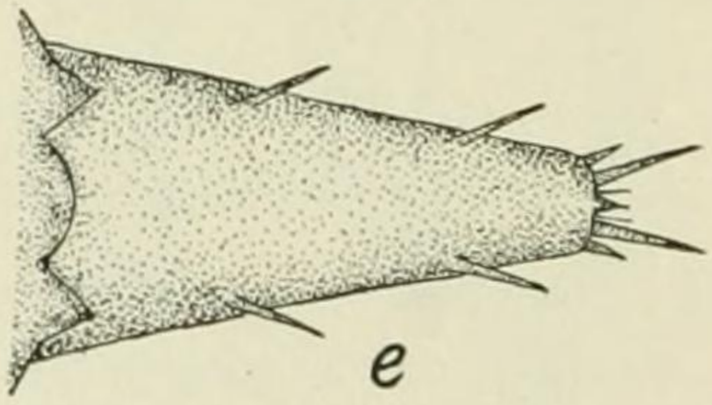

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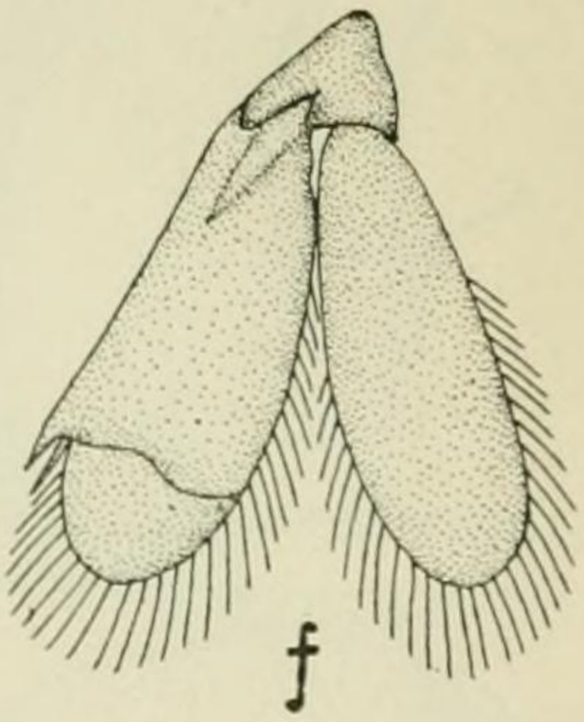

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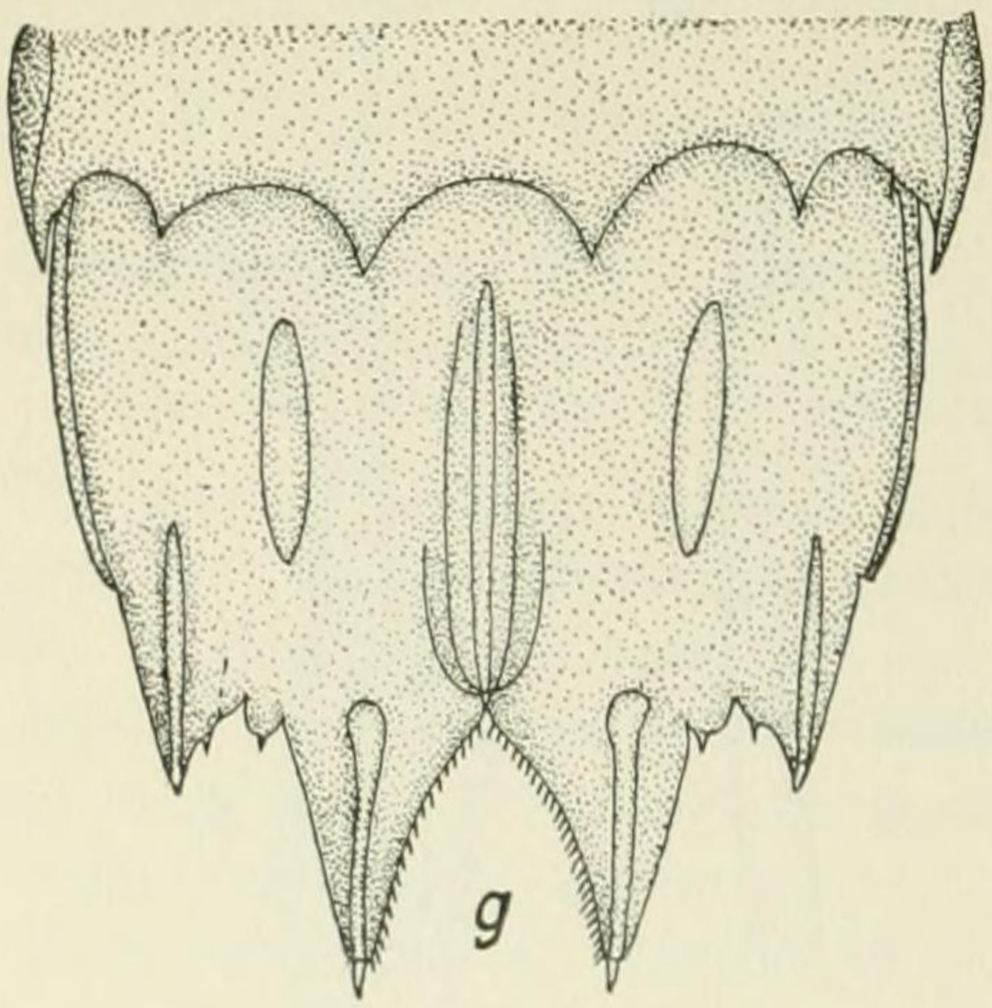

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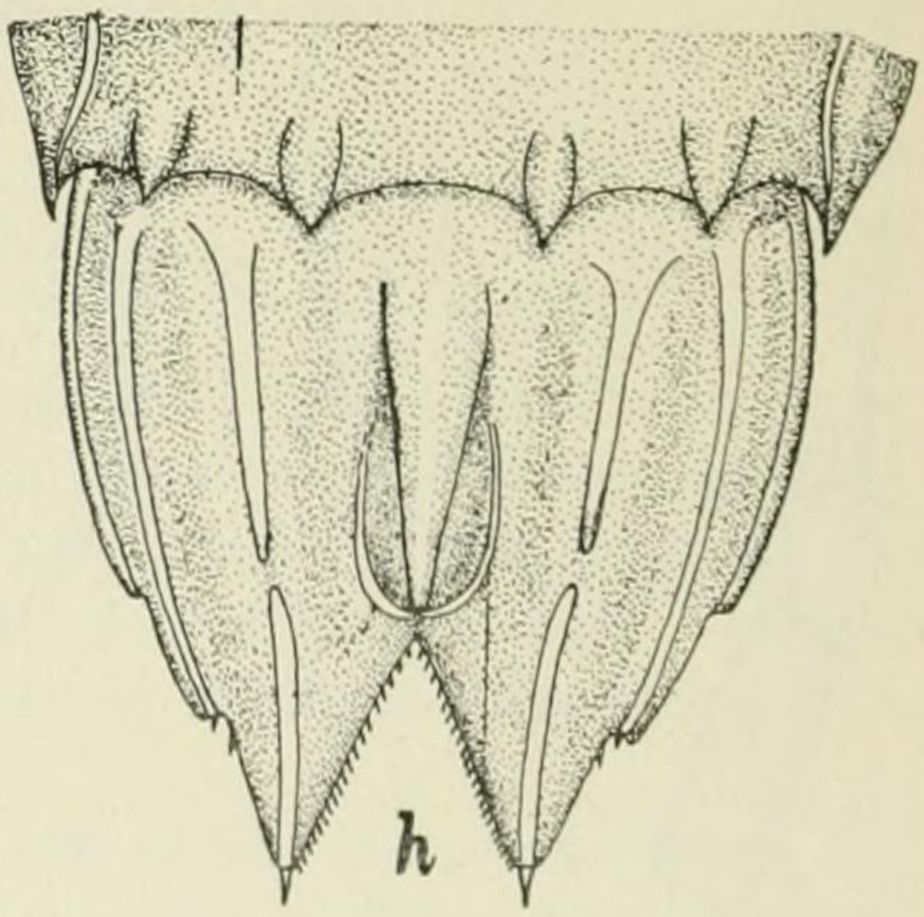

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FIGURE 3. Camera lucida drawings of features of *Hymenocera elegans,* and telsons of *Gonodactylus chiragra* and *Gonodactylus chiragra* var. *smithii; a,* third maxilliped of left side × 6; *b, serrated* spinule of medial border of second segment of third maxilliped (greatly enlarged); *c,* terminal segments of first walking leg × 10; *d,* posterior walking leg × 6; *e,* dorsal surface of telson × 6; *f,* uropod of left side × 5; *g,* telson of *Gonodactylus chiragra* var. *smithii* × 9; *h,* telson of *Gonodactylus chiragra* × 10.

Heller's description of the type specimen is sufficient and complete in most particulars but his accompanying figures are in many respects quite inadequate. I am, therefore, presenting more complete figures of this remarkable form and supplementing previous descriptions by some observations on the Palmyra specimens.

In all of the specimens collected at Palmyra the rostrum has 8 teeth on its upper border and 2 on its lower border. The mandibular palp is rudimentary, so much so that without close scrutiny it may be overlooked. No information is at hand regarding the mandibular palp in the type specimen. Since the presence of this appendage is a family characteristic, the condition of its development may possibly amount to a specific difference.

In the only specimen taken at Palmyra Island in which both of the second walking legs are intact, the appendage on the left side of the body is approximately one-fifth larger and longer than that on the right side. No mention is made in any of the descriptions that I have seen, of an inequality in size and length of the second walking legs. More material is necessary, I believe, to determine this inequality as a constant feature.

Heller states that the hand of the second walking leg is somewhat shorter than the arm segment. In the Palmyra specimens the palm is slightly longer than the merus, the length of the two segments being in the ratio of 4:3.

The presence of a papilla on the dorsal extremity of the corneal area, and a black pigment spot on the same side at the base of the cornea characterize the eye in the Palmyra specimens. These features, if they are present in the type specimen, are not mentioned in the description of it.

The color of the type specimen is given as grayish-white, in preserved condition. The Palmyra Island specimens, in alcohol, are pale yellowish-brown. Heller reports the type specimen to be 9.5 lines in length. The largest of the three specimens taken at Palmyra Island, an ovigerous female, measures 35 mm. from the tip of the rostrum to the extremity of the telson, with the abdomen straightened as much as possible.

Apparently the only other species of the genus known is *Hymenocera picta* Dana,[13] collected at Raraka Island, one of the Tuamotus. Dana's figures were made from the living specimen which was, however, subsequently lost in the wreck of the "Peacock."

The chief difference between Dana's species and *Hymenocera elegans* is, as other writers have noted, in the greater expansion of the segments of the third maxilliped in the latter.

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[13] Dana, James D., U. S. Expl. Exped., vol. 13, Crust., p. 592, 1852; pl. 39, fig. 3. a-c, 1855.

Family PONTONIIDAE

Harpilius depressus Stimpson.

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

The type locality is Hawaii where the species is very common. Other records are from various localities in the eastern and western Indian Ocean and the Red Sea. One specimen was collected at Palmyra Island.

Coralliocaris graminea (Dana).

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

The species ranges from Mozambique and Zanzibar through the Indian Ocean and the Red Sea to Hong Kong and Japan, and eastward to Fiji and Samoa. Five specimens were taken at Palmyra Island.

Coralliocaris lucina Nobili.

Coralliocaris lucina Nobili, Ann. Mus. Univ. Napoli, (n.s.), 1, No. 3, p. 5, 1901: Kemp, Rec. Indian Museum, vol. 24, pt. 2, p. 276, 1922.

The species is apparently widely distributed in the Indian Ocean and adjacent waters, having been recorded from Saya de Malha, the Chagos Archipelago, the south coast of Arabia, numerous localities in the Red Sea, the Maldive Achipelago, the Andamans, the coast of Ceylon and Ternate. I have no information of previous records in the Pacific Ocean. Thirty-three specimens were collected at Palmyra Island where the species is apparently common.

Coralliocaris tridentata Miers.

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

The species has previously been recorded from the type locality, Thursday Island. Two specimens were collected at Palmyra Island.

Family PALAEMONIDAE

Palaemonella tenuipes Dana.

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

The earlier records of the species are from the Sulu Sea and Hawaii. Borradaile and Nobili reported the species as *P. tridentata,* the former

from Funafuti, and the latter from New Guinea. Other records are from the Red Sea and the Liu Kiu Islands. Seven specimens were collected at Palmyra Island.

Tribe STENOPIDES

Family STENOPIDAE

Stenopus hispidus (Olivier).

Stenopus hispidus Rathbun, Bull. U. S. Fish Comm., vol. 20, pt. 2, p. 99, 1900.

The species ranges through the Indian Ocean and from the Balabac Passage, the coasts of Borneo and the Philippines to the China Sea and eastward to the Tuamotus and northward to Hawaii. The species also has a wide distribution in the Atlantic ranging from the Bermudas to the Bahamas, the Dry Tortugas and southeastward through the West Indies as far as St. Lucia. One specimen was collected at Palmyra Island.

Tribe PENEIDES

Family SERGESTIDAE

Leucifer reynaudi Milne Edwards.

Lucifer reynaudi Dana, U. S. Expl. Exped., vol. 13, Crust., p. 672, 1852; pl. 45, figs. 1 a-d, 1855.

The species has a very wide distribution, being known from numerous localities in the tropical Atlantic, and many records from the Indian and Pacific Oceans include the Mergui Archipelago, the Philippines, New Hebrides, Funafuti and Fiji. Two specimens were taken in the tow from the surface waters of the lagoon at Fanning Island.

Order STOMATOPODA

Family CHLORIDELIDAE

Pseudosquilla ciliata Miers.

Pseudosquilla ciliata Miers, Ann. and Mag. Nat. Hist., (5), vol. 5, p. 108, pl. 3, figs. 7, 8, 1880.

The species has a wide distribution in the tropical Atlantic, ranging from the Bahamas to the Florida Keys and Porto Rico. It is also known from Mauritius and the Red Sea through the Indian and Pacific Oceans to Hawaii where it is a common form. One specimen was collected at Palmyra Island.

Gonodactylus chiragra (Fabricius).

Gonodactylus chiragra Kemp. Mem. Indian Museum, vol. 4, p. 155, pl. 9, fig. 107, 1913.

The species is distributed throughout the Indian Ocean and ranges in the Pacific Ocean from Australia northward to Japan and eastward to Tahiti. A single specimen which corresponds in its chief features with the typical form of this species was collected at Palmyra Island by C. Montague Cooke Jr. in 1913.

The telson is narrow, its dorsal surface marked by five prominent carinae; median carina without a posterior spine but with well defined anchor-flukes; submedian carinae elongate, in line with the long carinae supporting the submedian teeth of the posterior border; intermediate carinae continuous throughout the length of the telson; lateral margins carinate.

Submedian teeth of the posterior border broad and prominent, terminating in small movable spines; intermediate teeth represented by rounded points without spines at their tips; lateral notches distinct. The distal extremity of the dactylus of the cheliped is strongly curved. Total length of the specimen, measured from the tip of the rostral spine to the terminating spines of the submedian teeth, is 30 millimeters. Figure 3, *h*, represents the telson of the Palmyra Island specimen.

Gonodactylus chiragra var. **smithii** Pocock.

Gonodactylus smithii Pocock, Ann. Mag. Nat. Hist. (6), vol. 11, p. 475, pl. 20, B, fig. 1, 1893.

Gonodactylus chiragra var. *smithii,* Lanchester, Fauna and Geogr. Maldive and Laccadive Archipelagoes, vol. 1, p. 447, pl. 23, fig. 4 and 4a, 1903.

The localities in the Indian Ocean from which the var. *smithii* has been recorded include Zanzibar, Salomon, Peros, the Maldive and Mergui Archipelagoes, the Andamans and the coasts of Burma and Ceylon. Previous records from the Pacific Ocean include a locality north of Australia, the Loyalty Islands and Rotuma.

Two specimens, females, having the characteristics of this variety were collected at Palmyra Island. Both are very small, the larger being 30 mm. in length. In both specimens the median carina of the telson terminates posteriorly in a spine and the anchor-flukes are distinct. Figure 3, *g*, represents the features of the telson of a Palmyra specimen.

Order AMPHIPODA[14]

Family GAMMARIDAE

Elasmopus sp.

Eighteen specimens are in the Bishop Museum from Palmyra Island.

Order ISOPODA[14]

Family TANAIDAE

A Tanaid.

There is one specimen from Palmyra Island in the Bishop Museum.

Leptognatha sp.

One specimen collected at Palmyra Island is in the Bishop Museum.

Family CIROLANIDAE

Cirolana sp.

There are 50 specimens in the Bishop Museum from Palmyra Island.

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[14] The amphipods and isopods here listed were taken from marine algae collected at Palmyra Island by Joseph F. Rock. The generic determinations were made by Clarence R. Shoemaker to whom specimens were submitted for identification. A more complete report may be made upon them at a later date.

DESCRIPTIONS OF NEW SPECIES OF CRABS FROM PALMYRA ISLAND

By Mary J. Rathbun

Maldivia palmyrensis, sp. nov.

Type.—Female; Palmyra Island; C. M. Cooke, collector; type-specimen in Bishop Museum, No. 312.

Carapace transversely oval, very convex from side to side, less so from front to back, the margin of the front visible in dorsal view. Indications of regions almost absent. Frontal and antero-lateral regions granulate. Front thin, edge granulate, nearly straight, outer corners rounded off, a slight median emargination, prolonged backward in a short groove. Of the 4 antero-lateral spinules, including that at the orbital angle, the second and third each have smaller spinules on their outer margins.

Chelipeds very unequal; merus short, armed with a longish spine at the distal end of the inner margin, two other, smaller, distal spines above, a subdistal spine on the upper margin; carpus, and upper and greater part of outer surface of manus armed with short, sharp, conical spines; the carpus has a large spine at the inner angle, a smaller marginal spine above and nearer the distal end. The spines of the manus are seriate, and for the most part arranged in alternating rows of large and small spines. The fingers are similar in the two chelae, white in the preserved specimen, bent slightly downward, their prehensile edges armed with a few unequal teeth which meet when the fingers are closed, while the tips cross. The roughness of the palms is continued on the dactyle in three superior rows of spines, reaching nearly half the length in the major chela, but more than half in the minor chela. The ambulatory legs are furnished with fine hairs, very scanty except on the dactylus; this terminates in a long, transparent, horny tip; besides the hairs, the segment is armed with a number of horny bristles; of these, two long stout ones are attached side by side over the nail and overlap the nail, reaching at least half way down its dorsal face; a few short bristles are further back, while two longitudinal rows of about four weak bristles each are on the lower or concave side of the dactylus. The armature would be very useful in clinging to algae or branching coelenterates.

Length of carapace of type female 3 mm. width 4.3 mm.

The genus Maldivia[15] contains two earlier species, *M. symbiotica* Borradaile,[16] the type species, found on a white gorgonian in 8 fathoms

[15] Borradaile, Fauna and Geogr. Maldive and Laccadive Arch., vol. 1, part 3, 1902, p. 269.

[16] *Op. cit.*, p. 270, text-fig. 60.

at the Maldive Islands; and *M. gardineri* Rathbun,[17] from Salomon Island, western Indian Ocean. In *M. symbiotica* the length and width of the carapace are subequal and the chelipeds of equal size. *M. gardineri* is more nearly like the new species, having an oval carapace and unequal chelipedes; it has, however, a more deflexed front with a slighter median emargination; the antero-lateral margin is smoother, without spinules between the interspaces of the four teeth; the whole outer surface of the manus is rough, the protuberances of the major manus being bead-like tubercles and granules, while those of the minor manus are more or less conical, but not so sharp and spinelike as in *palmyrensis;* the fingers of major chela are rough except near the tips, tubercles beadlike or slightly pointed; the fingers of the minor chela are broader than in *palmyrensis,* prehensile edges entire, immovable finger smooth and punctate. In both of the oval species, the merus of the outer maxilliped is broader than long; in *gardineri* the anterior margin is nearly straight outside the notch and rounds into the outer margin; in *palmyrensis* the anterior margin is convex outside the notch.

The armature of the ambulatory dactyls is similar in these two species, indicating a habitat akin to that of the type-species.

Charybdis (Charybdis) cookei, sp. nov.

Type.—Male; Palmyra Island; C. M. Cooke, collector; type-specimen in Bishop Museum, No. 983.

In the subgenus Charybdis (=Goniosoma Alcock)[18] there are combined the following characters: The antennal flagellum is completely excluded from the orbital hiatus; the ridge that bounds the dorsum of the carapace posteriorly forms a curve with the postero-lateral borders; and there is no spine on the posterior border of the arm. Our species belongs to that section of the subgenus which has a ridge on the cardiac region and to that subsection which has also a ridge or two on the posterior half of the branchial region.

The species is of small size; carapace pubescent, the three anterior transverse ridges strong, the cardiac ridge blunter, continuous, the single branchial ridge short, not far from, and a little in advance of, the cardiac ridge. Of the frontal teeth, those of the median pair are narrow, arcuate; those of the submedian pair wide, subtruncate, a little oblique, less advanced; antennal pair narrower, more triangular and still less advanced; orbital pair least advanced, broad, obliquely triangular, tip rounded. Upper margin of orbit with two open, triangular marginations. Five antero-

[17] Trans. Linn. Soc. London, ser. 2, vol. 14, 1911, p. 233, pl. 19, figs. 5 and 6.
[18] Journ. Asiat. Soc. Bengal, vol. 68, 1899, p. 49.

lateral teeth, the first three similar, the fifth smaller, the fourth the smallest, very slender and crowded toward the third. Lobe on basal antennal segment, low, rounded. Inner suborbital angle obtuse.

Dorsal aspect of cheliped pubescent and granulate. Three spines on inner margin of merus. Inner spine of carpus strong, two spines on outer side of anterior margin, the lower very small, one spine on outer surface. Four spines on manus, one at articulation of carpus, two on the inner ridge of the upper surface and one on the outer ridge, the customary distal spine of this ridge being suppressed; three ridges on outer surface, the upper of which is incompleted and forms the boundary of the pubescent area; below it the surface is smooth; the second ridge is in line with the space between the fingers, the lowest ridge is continued to the extremity of the immovable finger.

The merus of the swimming leg is armed below with a strong subdistal spine while the propodus with a row of slender spines. The sixth segment of the male abdomen has arcuate lateral margins, the terminal segment is equilaterally triangular. Extreme length of the carapace of type male 8.2 mm., width of same between tips of last (or posterior) lateral teeth 12.2 mm.

C. longifrons (A. Milne Edwards)[19] is the only other species of the some subsection of the subgenus Charybdis, which has just five antero-lateral teeth; it has however, six elongate frontal teeth of nearly equal size, the wrist and the palm are each armed with five teeth, and the spine at the lateral angle of the carapace is the longest of that series. The species is, moreover, larger and coarser than *C. cookei.*

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[19] *Goniosoma longifrons* A. Milne Edwards, Nouv. Arch. Mus. Hist. Nat., Paris, vol. 5, 1869, p. 155, pl. 7, figs. 1-5.

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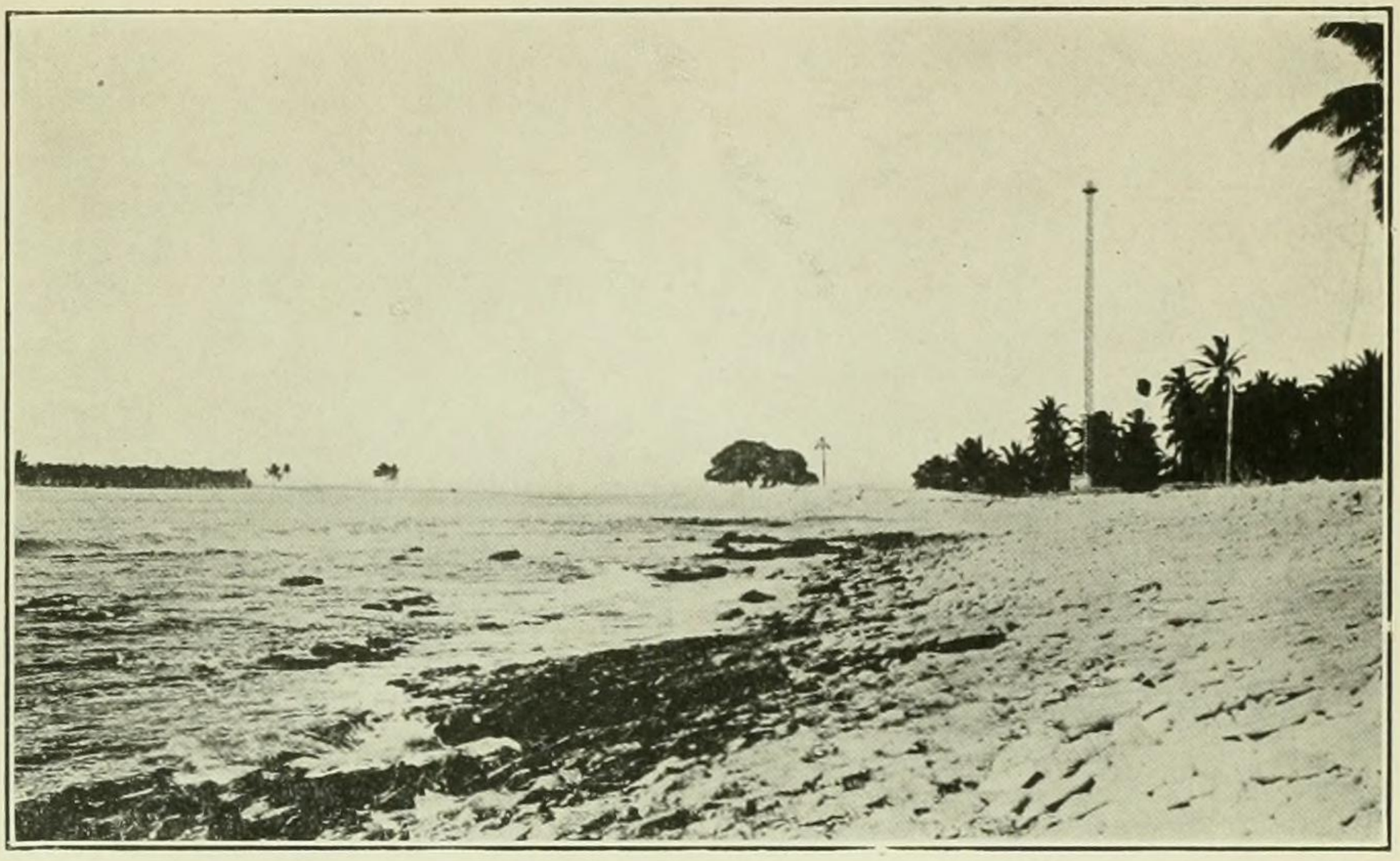

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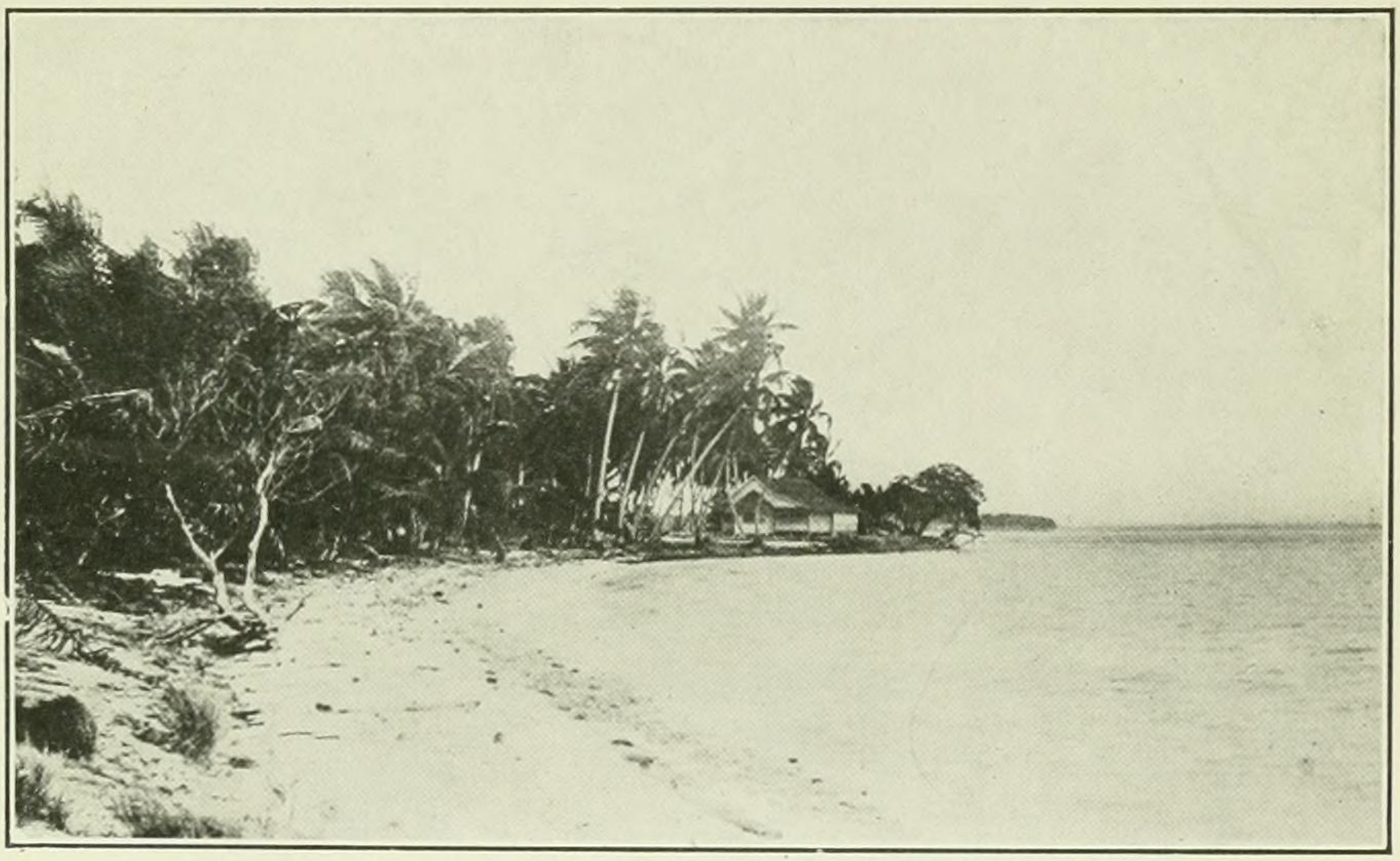
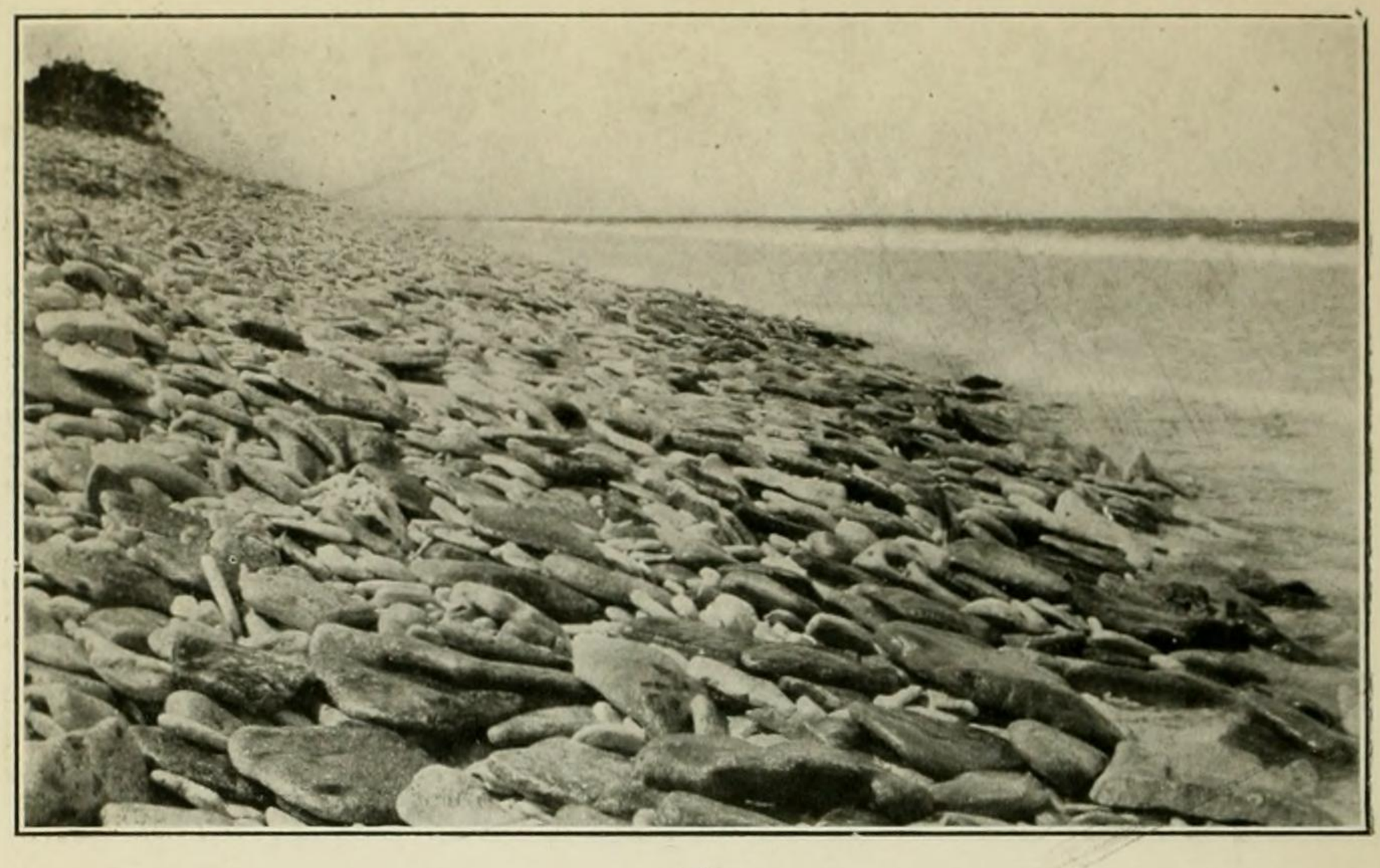


B

SHORE LINES, FANNING ISLAND.

In view *A* the camera is directed northward into the lagoon, through the main channel at English Harbor; view *B* shows the sandy beach of the lagoon near English Harbor. On such beaches Ocypode ceratophthalma is common; at night the beach is lined with myriads of burrowing land crabs, Cardisoma carnifex. —Photographs by Clarence A. Brown.



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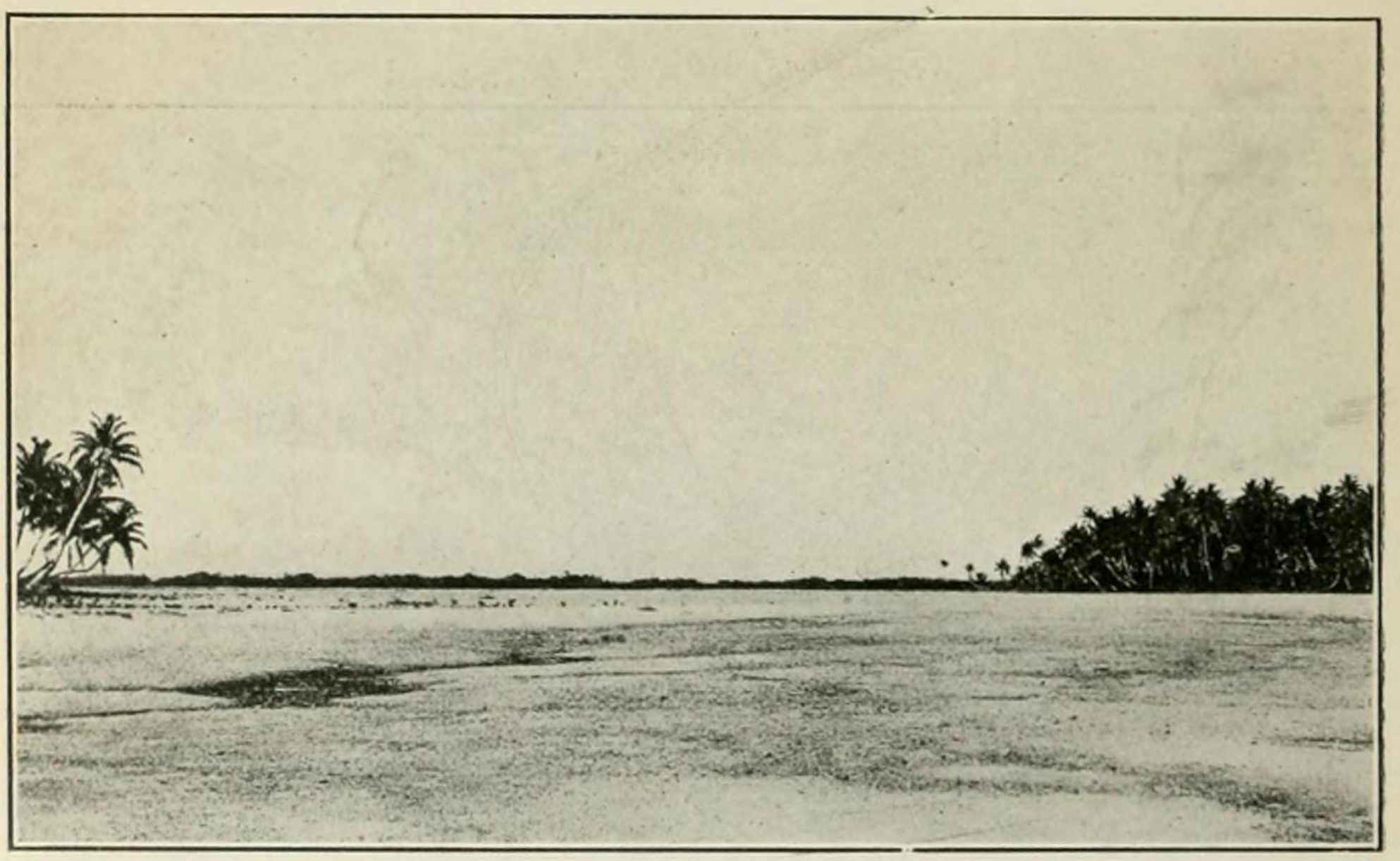

B

SHORE LINES, FANNING ISLAND.

View *A* is typical of the outer shore line on the southwest side of the island. Shingle-like stones, once living coral heads, are piled high on the beach and offer concealment for numerous forms of marine invertebrates. The line of breakers in the background indicates the outer rim of the rocky shelf which surrounds this part of the island. (Photograph by Charles H. Edmondson.) In view *B* the camera is directed toward the ocean near the south end of the island, across one of the numerous sandy tide flats, on which the burrowing "fiddler crab," Uca annulipes, is abundant. (Photograph by Clarence A. Brown).