OCCASIONAL PAPERS

OF THE

BERNICE PAUAHI BISHOP MUSEUM OF POLYNESIAN ETHNOLOGY AND NATURAL HISTORY

VOL. VIII—NO. 2

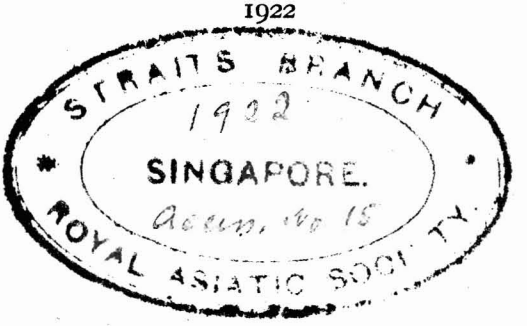
WITH PLATES I-II

HAWAIIAN DROMIIDAE

BY

CHARLES HOWARD EDMONDSON

HONOLULU, HAWAII
BISHOP MUSEUM PRESS
1922



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INTRODUCTION

Among the various special means of protection employed by marine crustaceans one of the most remarkable is the habit of holding over their backs sponges, sea anemones, bivalve mollusk shells, bits of seaweed, or other objects by means of which the host is wholly or partly concealed. The commensal relationship is made possible by the prehensile characteristics of the third and fourth pairs of true walking legs, or of the fourth pair, which are reduced in size, dorsal or subdorsal in position and in many species terminated in chelate or subchelate claws. This strange habit has been observed among certain of the sand crabs of the family Dorippidae, and is of general occurrence in the group Dromiacea, commonly designated as sponge crabs.

Recent investigators are not all in accord as to the taxonomic position of the Dromiacea. Alcock[1] and Borradaile[2] attach the group to the Brachyura, the former giving it the title "Brachyura Primigenia." Benedict[3] and Henderson[4] consider the group as properly within the anomuran division of the decapods. Whether scientists retain the Dromiacea as higher forms of the Anomura (as I am inclined to do), or advance them to the lower division of Brachyura is of small importance. The significant feature of the group is that its members, while showing a considerable degree of specialization in some respects, still retain certain primitive characters indicative of ancestral relation-

[1] Alcock, A., Catalogue of Indian decapod Crustacea in the collection of the Indian Museum, pt. 1, Brachyura, fasc. 1, pp. 1-80, pls. *A* and 1-7, 1901.

[2] Borradaile, L. A., The sponge-crabs (Dromiacea): Fauna and geography of the Maldive and Laccadive archipelagoes, vol. 2, pt. 1, p. 574, 1903.

[3] Benedict, J. E., The anomuran collection made by the "Fish Hawk" expedition to Porto Rico; U. S. Fish Comm. Bull. vol. 20, pt. 2, pp. 129-148, pls. 3-6, 1900.

[4] Henderson, J. R., Report on the Anomura collected by H. M. S. "Challenger" during the years 1873-76: Voy. of H. M. S. "Challenger," Zool., vol. 27, pp. 1-221, pls. 1-21, 1888.

ship that clearly mark their line of ascent from the macruran or lower division of the decapods.

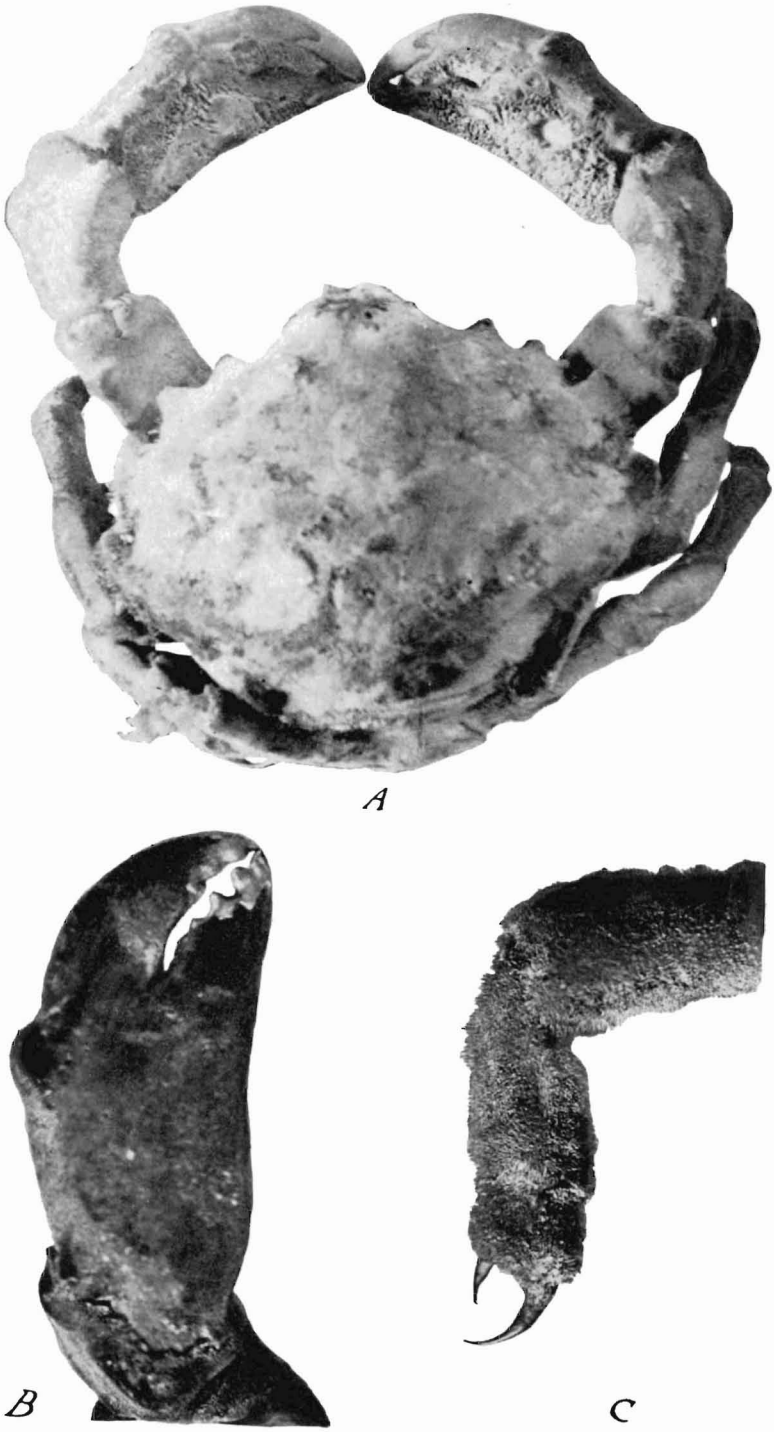
Referring to the primitive characteristics exhibited by the Dromiacea, Borradaile[5] says: "The most important of these features are: the presence of a pair of vestigial limbs on the first abdominal segment of the female, and often on the sixth in both sexes, the epipodites, which are often found on one or more of the pairs of legs, the number of gills, which is usually large, the more or less square shape of the mouth, the large, usually free, basal joint of the antennal stalk, and the often incomplete orbits." Regarding the presence of vestigial limbs on the sixth segment referred to in the preceding quotation, Borradaile, in a foot-note, p. 574, says: "Bouvier (Bull. Soc. Philomath. Paris, 1896) throws doubt on the correctness of the view which homologizes the structures of this segment in Dromiidae with the last pair of limbs in Macrura." Besides the reduced size and the position of the posterior legs of members of this group, as mentioned above, most of the species are provided with dense coats of hairs or bristles that vary greatly.

At least five families of the group Dromiacea have been recognized by investigators. This report, however, is concerned only with the members of the family Dromiidae known to inhabit the waters about the islands of Hawaii.

The most important characteristics of the family Dromiidae may be summarized as follows: carapace variable as to outline and convexity but with lateral borders usually well defined; sternal grooves of female variable; exopodites confined to the chelipeds, or absent; orbits complete; small lateral plates between the sixth and seventh abdominal segments; both fourth and fifth pairs of legs subdorsal and usually prehensile. Borradaile,[6] in 1903, revised a number of genera of the family Dromiidae, stating, however, that the arrangement was only tentative owing to the lack of information regarding some of the important features of certain species. It must be expected that with a more complete knowledge of forms

[5] Op. cit.

[6] Borradaile, L. A., On the genera of the Dromiidae: Ann. and Mag. Nat. Hist., ser. 7, vol. 11, pp. 297-303, 1903.



PHOTOGRAPHS OF DROMIA RUMPHII AND APPENDAGES: *A*, DORSAL VIEW OF SPECIMEN × 3/8; *B*, CHELIPED × 1/2; *C*, POSTERIOR LEG × 1 1/3.

already described and the discovery of new ones there will be some shifting of the species and repeated modifications of generic descriptions. Borradaile recognizes twelve genera of the Dromiidae, omitting two other possible ones for lack of information concerning them. His system of genera seems to be the best set forth up to the present time and is the one followed in this report.

This family is widely distributed in the warmer oceans of the world and extends into temperate waters, at least along the shores of Europe and Japan. Its range is from the shallow water of reefs and bays to considerable depths. *Cryptodromia buliffera* Alcock was taken by the "Investigator" near Cinque Island, Andamans, at 490 fathoms.

Of the Dromiidae known to inhabit the waters about the islands of Hawaii, the writer has records of but four species, one of which he has not seen. One specimen that apparently represents a new subspecies is described in the following pages. The four species represent three genera.

DROMIA Fabricius[7]

Dromia rumphii Fabricius. Plate I.

Dromia rumphii Fabricius, Ent. Syst. Suppl., p. 360, 1796.—Alcock, Journ. Asiat. Soc. Bengal, vol. 68, pt. 2, p. 137, 1899, and synonymy.—Lenz, Ergebnisse einer Reise nach dem Pacific (Schauinsland 1896-1897).—Crustaceen: Zoolog. Jahrb. Band 14, Heft 5, p. 450, 1901.—Alcock, Catalogue Indian Decapod Crustacea in the Collection of the Indian Museum, pt. 1, Brachyura, fasc. 1, p. 44, pl. 2, fig. 4, 1901.—Borradaile, Fauna and Geogr. Maldive and Laccadive Archipelagoes, vol. 2, p. 576, 1903.

Alcock, in the above citations, reports the general distribution of this species to be from Mauritius, Mozambique, and the Red Sea to Japan. Borradaile records the form from Haddumati atoll, Maldive Group, and Lenz reports a single specimen from Honolulu.

There are in the Bishop Museum four specimens of this species, three males and one female, probably from the Hawaiian waters although no data accompanies them. They are all adult forms and are in accord with previous descriptions.

[7] For a revised definition of the genus see Borradaile, op. cit. p. 298.

Edwards,[8] evidently describing an immature animal, gives the length as 2 inches. Alcock records the largest specimen in the Indian Museum, from Mauritius, as 5¾ inches across the carapace. The largest specimen in the Bishop Museum, a male, measures 183 millimeters between the tips of the teeth immediately behind the branchial grooves. The carapace is 149 and the hand 145 millimeters in length. Plate I, *A,* represents a photograph of a Bishop Museum specimen, *B,* a cheliped of the same, and *C,* a posterior leg.

The species is usually found in comparatively shallow water. In the Indian Ocean it has been taken by the "Investigator" from depths down to 67 fathoms. No information regarding the exact locality or the depth from which the specimens in the Bishop Museum were taken is at hand.

DROMIDIA Stimpson[9]

Dromidia hirsutissima (Lamarck).

Dromia hirsutissima Desmarest, Consid. sur les Crust., p. 137, pl. 18, fig. 1, 1825.—Edwards, Hist. Nat. des Crust., vol 2, p. 176, 1837.—Lamarck, Hist. des An. sans Vert., vol. 5, p. 481, 1838.—Dana, U. S. Expl. Exp., vol. 13, p. 403, 1852.

This species is listed here in consideration of Dana's record from local waters. The writer has seen no specimens of it and has had opportunity to consult but one published description of the species. A. M. Edwards gives the length of the form as about 2 inches and the locality as the Cape of Good Hope. Dana's only comment regarding the species is "Sandwich Islands, five inches in length. Also Cape of Good Hope."

Dromidia unidentata (Ruppell) subsp. **hawaiiensis,** new subspecies. Plate II, *D;* figure 1, *a-j.*

Dromia unidentata Alcock, Journ. Asiat. Soc. Bengal, vol. 68, pt. 2, p. 139, 1899, and synonymy; Catalogue of Indian Decapod Crustacea in the Collection of the Indian Museum, pt. 1, Brachyura, fasc. 1, p. 47, 1901.

[8] Edwards, A. M., Histoire Naturelle des Crustacés, vol. 2, p. 174, 1837.

[9] For a revised definition of the genus see Borradaile, op. cit. p. 299.

A general description of the subspecies follows:

Carapace longer than broad, strongly convex in both directions; front deeply notched, the two dorsal teeth broad but sharp with a deep furrow between them that extends back on the carapace a little distance; middle tooth of front very small and on a lower level so that it is invisible from above; carapace smooth with regions obliterated except the cardiac, which is faintly outlined; a small oval depression at each antero-lateral angle of the cardiac region, and a very shallow transverse groove representing the posterior boundary of the intra-medial region; orbit with a distinct tooth about the middle of the upper border, representing the inner orbital angle; outer orbital angle prominent; antero-lateral border of the carapace without teeth, curving to the branchial groove; branchial groove well pronounced, extending inward to the cardiac region; thick, chitinized portion of the postero-lateral border of the carapace straight for a little distance behind the branchial groove, there bending abruptly toward the posterior border, postero-lateral corner of carapace rounded out by a thin membrane; cheliped smooth, without epipodite; arm narrow above; wrist with two blunt tubercles on the anterior, outer border; hand rounded above and below; fingers excavated at tips, index with three teeth on the cutting edge, dactylus with three or four very indistinct teeth; last walking leg longer than the preceding one, the propodites of both short and broad, subchelate; a third strong spine on the distal border of the propodite of the last walking leg and two small spines on the outer border of the propodite of the third true walking leg; entire surface, with the exception of the fingers and the tips of the claws, covered with a short, dense coating of hairs; carapace in life, marked by numerous small pearl-white spots.

The color in life is deep orange with the exception of the propodites and claws of the first and second true walking legs, which are pale green. Corneal region of the eye is white, flecked with crimson. The carapace of the specimen in the Bishop Museum was when found completely concealed by a dark-gray sponge.

Greatest length of carapace is 6 millimeters, breadth 5½ millimeters.

Locality: Waikiki reef, Honolulu, in a block of dead coral. Type subspecies, a male in the Bishop Museum (Catalogue No. 571).

This small form, which I have designated as a subspecies, corresponds very closely to the descriptions and figures of the type species *Dromidia unidentata* (Ruppell) but seems to differ from it in certain features. Since only a male has been examined the char-

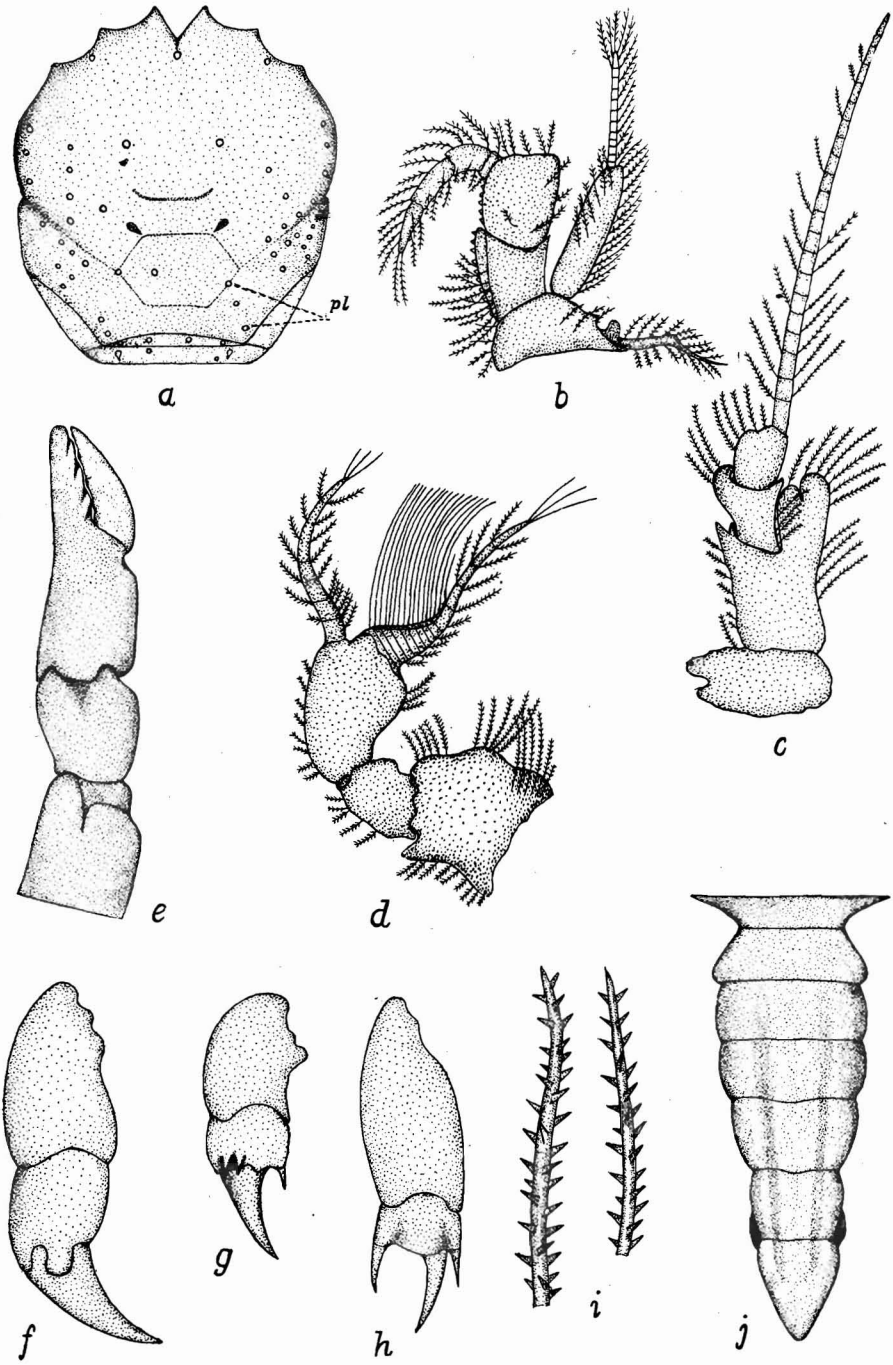


FIGURE 1. Camera lucida drawings of structural features of *Dromidia unidentata hawaiiensis*, new subspecies: *a*, dorsal surface of carapace showing distribution of the pearl-white spots, *pl*, × 7; *b*, outer maxilliped × 10; *c*, antenna × 20; *d*, antennule × 36; *e*, cheliped, with hairs removed, × 13; *f*, second true walking leg, with hairs removed, × 14; *g*, third true walking leg with hairs removed, × 14; *h*, posterior walking leg, with hairs removed, × 15; *i*, hairs typical of carapace and appendages, greatly magnified; *j*, abdomen of male × 28.

acter of the sternal grooves in the female of the Hawaiian form is unknown.

In the Hawaiian subspecies the postero-lateral region of the carapace is composed of two very distinct portions, the thick, chitinized portion, which is straight for a little distance behind the branchial groove, bending very abruptly toward the posterior border, and a thin, apparently non-chitinized membrane, which rounds out the postero-lateral border. The edge of the chitinized portion is parallel with the branchial groove.

The pearl-white spots are distributed on the dorsal surface as well as that of the carapace ventral to the antero-lateral region. Their arrangement and distribution is represented in figure 1, *a*. Some of the spots are very distinct before the surface is denuded of the tomentose covering. The spots number 53 on the dorsal surface of the carapace and on the first abdominal segment, which is seen from above. Ventral to the antero-lateral region is a group of about a dozen similar spots on each side. These spots are not represented by tubercles or bosses but are markings in the carapace or the tissue immediately beneath the carapace. They are very conspicuous in life but fade in alcohol.

The tomentose covering of the crab is short and dense, but longer hairs are found on the lateral borders of the carapace and the legs. The hairs are thickly set with short, flat, triangular branches as indicated by figure 1, *i*.

Almost immediately after the removal of the sponge, which completely concealed the carapace of the specimen described, the crab substituted a fragment of seaweed for its previous covering.

Owing to the small size of the Hawaiian form there is some reason to believe that it may be immature. The largest specimen of *Dromidia unidentata* in the Indian Museum has a carapace 24 millimeters long—according to Alcock, who also announces the distribution of the species as "Red Sea and East coast of Africa. Persian Gulf, Ceylon, Coromandel coast, Andaman Sea, Malay Archipelago."

CRYPTODROMIOPSIS Borradaile[10]

Cryptodromiopsis tridens Borradaile. Plate II, *A-C*.

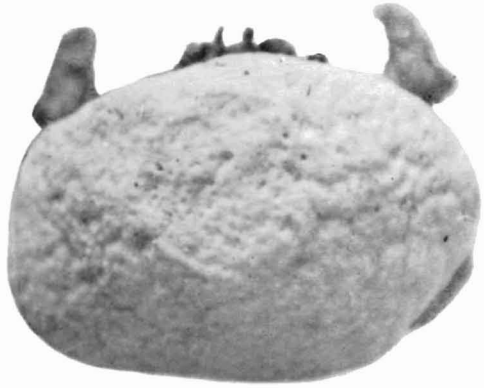
Cryptodromiopsis tridens Borradaile, Fauna and Geogr. Maldive and Laccadive Archipelagoes, vol. 2, pt. 1. p. 578, pl. 33, figs. 4a and 4b, 1903.

The occurrence of this species in Hawaiian waters is of considerable distributional interest since the only other localities from which it seems to have been reported are Male and Minikoi atolls in the Indian Ocean, where Borradaile's specimens were taken.

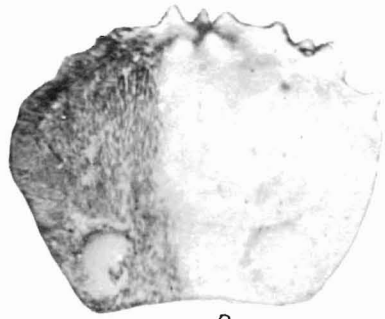
Specimens from Waikiki reef, Honolulu, correspond very closely in structural features with the description of the type. It may be noted, however, that in the Hawaiian form the bosses on either side of the cardiac region are more broadly oval than Borradaile's figure would indicate, and that the long axes of the bosses in the Hawaiian specimens are antero-posteriorly placed instead of following the lines of the branchial grooves as figured by Borradaile.

The type specimen is recorded as 6 millimeters in length and 8 millimeters in breadth. The largest of the Hawaiian specimens is 7 millimeters long and 8.5 millimeters broad. There are in the Bishop Museum five specimens, four males and one female, all taken from blocks of dead coral in very shallow water on Waikiki reef. Each crab carried a commensal sponge.

[10] Op. cit. p. 299.

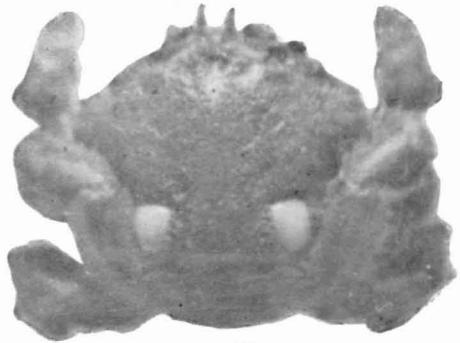


A



B

D



C

PHOTOGRAPHS OF RARE SPECIES OF HAWAIIAN DROMIIDAE. *A*, CRYPTODROMIOPSIS TRIDENS, CARAPACE CONCEALED BY A COMMENSAL SPONGE, × 5; *B*, CARAPACE PARTLY DENUDED OF ITS HAIRY COVERING, × 5½; *C*, CARAPACE WITH THE SPONGE REMOVED, × 4½; *D*, DROMIDIA UNIDENTATA HAWAIIENSIS, NEW SUBSPECIES, WITH SPONGE REMOVED, × 4.