

Hawaiian Xanthidae (Decapoda: Brachyura) I. Specimens at the California Academy of Sciences

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ABSTRACT

A collection of 94 lots of Hawaiian xanthid crabs from the California Academy of Sciences (CAS) was studied. The 39 species identified in 24 genera and listed herein comprise 35% of the xanthid species reported from the Hawaiian Islands. The largest component (29 lots) of the collection is from the 1902 U.S.F.C. Steamer *Albatross* Expedition. The CAS Hawaiian *Albatross* xanthid collection differs from the Smithsonian Institution's *Albatross* collection in that it includes *Chlorodiella cytherea*. Subsequent studies by the author at the Bishop Museum indicate that *Chlorodiella nigra* does not occur in the Hawaiian Islands and that Hawaiian specimens so named should be referred to *Chlorodiella cytherea*. The species *Lophozozymus intonsus* from the Hawaiian Islands was compared to *Xanthias tetraodon* and *Xanthias lividus*, resulting in the recommendation that the genus *Juxtaxanthias* be resurrected to include these 3 species.

INTRODUCTION

The only comprehensive studies of Hawaiian Xanthidae are those that were conducted by Rathbun (1906) and Edmondson (1962). These studies were based on materials in the Bishop Museum; the substantial U.S.F.C. Steamer *Albatross* Expedition collections located at the Smithsonian Institution; materials from the Muséum National d'Histoire Naturelle, Paris, the Museum of Comparative Zoology, and the Philadelphia Academy of Natural Sciences; and records from the literature.

During a visit to the California Academy of Sciences (CAS) in San Francisco, California, I examined 94 lots of Hawaiian xanthid crabs. The largest component of this collection, 29 lots, was from the 1902 *Albatross* Expedition. Some of the *Albatross* specimens previously had been deposited at Stanford University. Because there are no records of this material having been transferred from the Smithsonian Institution (where most *Albatross* material is curated) to either Stanford University or CAS (R. Manning, pers. comm. 1984), it is likely that the material was split aboard ship and deposited directly into the institutions while the *Albatross* was anchored in San Francisco Bay.

Approximately 111 species of xanthids (Edmondson 1962) in 51 genera have been reported from the Hawaiian Islands. The CAS has representatives of 39 species (Table 1), comprising 35% of those reported. As such, it has the most complete Hawaiian xanthid collection after the Bishop Museum and the Smithsonian Institution.

The abbreviated synonymies listed include primarily Hawaiian references. Under specimens examined, the "?" before D.P. Abbott as the collector occurs on the specimen labels.

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SYSTEMATIC ACCOUNT

***Chlorodiella cytherea* (Dana)**

Fig. 1a-d

Chlorodius cytherea Dana, 1852a: 79; 1852b: 213; 1855: pl. 12, fig. 2a-c.? *Chlorodiella niger*: Rathbun 1906: 857.*Chlorodiella niger*: Edmondson 1925: 44 [part]; 1962: 281 [not fig. 23d] [not *Cancer niger* Forskål].*Chlorodiella nigra*: Edmondson 1946: 296 [not fig. 179a] [not *Cancer niger* Forskål].

Specimens examined. HAWAIIAN IS: 1♂, 1♀, O'ahu I, Honolulu, Waikiki, shallow water among corals, 30.XI.1938 (?D.P. Abbott) (CAS 016502). NORTHWESTERN HAWAIIAN IS: 1♂, 1♀, Laysan I, 1902 (*Albatross* Exped.) (CAS 052732).

Remarks. Although not reported in the 2 most recent reviews of Hawaiian xanthid crabs (Rathbun 1906; Edmondson 1962), *Chlorodiella cytherea* was described from material collected from Tahiti, the Tuamotu Archipelago, and the Hawaiian Islands (Dana 1852b). In a study of material in the Bishop Museum subsequent to the CAS study, I assigned all Hawaiian specimens of *Chlorodiella* to *C. cytherea* and *C. laevisissima* (Dana, 1852). The Hawaiian material in the Bishop Museum previously identified as *C. nigra* (Edmondson 1925, 1933, 1946, 1962) is for the most part *C. cytherea*, although some is *C. laevisissima*. The absence of *C. nigra* from the Hawaiian Islands is corroborated by the non-*Albatross* xanthids in the Smithsonian Institution (J. Garth, pers. comm. 1984), suggesting that Rathbun's (1906) records of *C. nigra* from Hawaiian *Albatross* material are probably *C. cytherea*.

Although Edmondson erroneously reported *Chlorodiella nigra* from the Hawaiian Islands, some of his photographs appear to be of *C. nigra* (1933: fig. 152f; 1946: fig. 179a; 1962: fig. 23d). Very likely he used a photograph of a non-Hawaiian *C. nigra* for his manuscripts.

Figure 1 will help to distinguish the 2 species of *Chlorodiella* found in the Hawaiian Islands. The areolation of the anterolateral borders of the carapace is generally more developed in *C. cytherea*, and the teeth of the chelipeds are larger. However, both of these characters are variable and can change with age and size. Although females are difficult to identify with certainty, males can be easily separated by the shape of the gonopod tip (Fig. 1d,h).

The Bishop Museum has representatives of *C. nigra* from Wake Atoll, and representatives of *C. nigra*, *C. cytherea*, and *C. barbata* (Borradaile, 1900) from the Line Islands. However, only *C. cytherea* and *C. laevisissima* are represented from Johnston Island and the Hawaiian Islands.

***Chlorodiella laevisissima* (Dana)**

Fig. 1e-h

Chlorodius laevisissimus Dana, 1852a: 80; 1852b: 215; 1855: pl. 12, fig. 4a-g.*Chlorodiella laevisissima*: Rathbun 1906: 857.—Edmondson 1946: 296; 1962: 281, fig. 23c.*Chlorodiella niger*: Edmondson 1925: 44 [part] [not *Cancer niger* Forskål].

Specimens examined. HAWAIIAN IS: 1♂, Maui I, off Lahaina, 18-64 m, V.1918 (CAS 052745); 2 juveniles, O'ahu I, Waikiki, inside dead coral blocks, 1938 (?D.P. Abbott) (CAS 016540); 1 juvenile, *Albatross* Sta D.3849 (*Albatross* Exped.) (CAS 052741); 1♂, 1♀, 1 juvenile, O'ahu I, Kahala Bay, XI.1918 (E.M. Ehrhorn) (CAS 052808); 1♀, O'ahu I, Honolulu beach, VI.1918 (E.M. Ehrhorn) (CAS 052807); 1♂, 2♀, 1 juvenile, *Albatross* Sta D.3847 (*Albatross* Exped.) (CAS 052811). NORTHWESTERN HAWAIIAN IS: 2♂, Laysan I, 1902 (*Albatross* Exped.) (CAS 052742).

Remarks. See remarks under *Chlorodiella cytherea*.

Table 1. Hawaiian xanthid specimens examined in the California Academy of Sciences.

Species	Station no. of <i>Albatross</i> material*	Cat. no. of CAS material examined
<i>Actumnus obesus</i> Dana, 1852	D.3849	052597
<i>Carpilius convexus</i> (Forskål, 1775)	Honolulu Reef	015919, 044134, 052744, 052820, 053531, 053532, 053533, 053534
<i>Carpilius maculatus</i> (Linnaeus, 1758)		053535
<i>Chlorodiella cytherea</i> (Dana, 1852)	Laysan I	016502, 052732
<i>Chlorodiella laevissima</i> (Dana, 1852)	D.3847, D.3849, Laysan I	016540, 052741, 052742, 052745, 052807, 052808, 052811
<i>Domecia hispida</i> Eydoux & Souleyet, 1842	D.4063	050155
<i>Epiactaea nodulosa</i> (White, 1847)	D.4034	052590, 052827
<i>Etisus electra</i> (Herbst, 1801)	Honolulu Reef	046282, 053030
<i>Etisus laevimanus</i> Randall, 1840	Pearl Harbor	052804
<i>Etisus splendidus</i> Rathbun, 1906		052658
<i>Gaillardiiellus superciliaris</i> (Odhner, 1925)		016503
<i>Juxtaxanthias intonsus</i> (Randall, 1840)		016491, 046619, 052659
<i>Leptodius exaratus</i> (H. Milne Edwards, 1834)	Hilo	016543, 052823
<i>Leptodius sanguineus</i> (H. Milne Edwards, 1834)	Hilo	010729, 016494, 018146, 052588, 052591
<i>Liomera</i> (L.) <i>bella</i> (Dana, 1852)	Laysan I	016459, 052743, 053031
<i>Liomera</i> (L.) <i>rubra</i> (A. Milne Edwards, 1865)	D.3876	017892, 052812
<i>Liomera</i> (L.) <i>rugata</i> (H. Milne Edwards, 1834)		016451
<i>Liomera</i> (L.) <i>supernodosa</i> (Rathbun, 1906)	D.3960	052595
<i>Liomera</i> (L.) <i>virgata</i> (Rathbun, 1906)	D.3849	052809
<i>Lophozozymus dodone</i> (Herbst, 1801)	Waialua (O'ahu)	014466, 052584, 052814, 052824
<i>Macromedaeus crassimanus</i> (A. Milne Edwards, 1867)		014455, 016476, 016490, 016493, 016541, 052600
<i>Medaeus elegans</i> A. Milne Edwards, 1867		014465
<i>Medaeus ornatus</i> Dana, 1852	D.3876	050158
<i>Neoxanthops angustus</i> (Rathbun, 1906)	D.3847	053025
<i>Panopeus</i> sp.		052740
<i>Paractaea rufopunctata</i> (H. Milne Edwards, 1834)	D.4128	052598, 052810
<i>Paraxanthias notatus</i> (Dana, 1852)	Laysan I	010705, 015353, 016501
<i>Phymodius monticulosus</i> (Dana, 1852)	Honolulu	053033
<i>Phymodius nitidus</i> (Dana, 1852)	Laysan I	016455, 050156, 052801
<i>Pilodius areolatus</i> (H. Milne Edwards, 1834)	Laysan I	014454, 016470, 018157, 052586, 052594, 052803, 052822
<i>Pilodius flavus</i> Rathbun, 1893	D.4159	050157, 052589
<i>Pilodius kauaiensis</i> (Edmondson, 1962)		017422, 052660
<i>Pilumnus nuttingi</i> Rathbun, 1906	D.4163	052813, 053017
<i>Platypodia eydouxii</i> (A. Milne Edwards, 1865)	Honolulu Reef	014462, 052800, 052805, 052821

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Table 1. Continued.

Species	Station no. of <i>Albatross</i> material*	Cat. no. of CAS material examined
<i>Platypodia semigranosa</i> (Heller, 1861)		052661, 052802
<i>Pseudoliomera speciosa</i> (Dana, 1852)		052819
<i>Trapezia cymodoce</i> (Herbst, 1799)**		052587
<i>Trapezia intermedia</i> Miers, 1886	Honolulu	015711, 015739
<i>Trapezia</i> spp.		015753, 017689
<i>Xanthias canaliculatus</i> Rathbun, 1906		052806

* See Table 2 for *Albatross* Station data.

** These specimens were originally identified as *T. ferruginea*, which has recently been synonymized with *T. cymodoce* (Odinetz 1984).

Table 2. Partial list of U.S.F.C.Str. *Albatross* Hawaiian stations.

Station no.	Date	Position	Depth (m)	Character of bottom*
D.3847	8 Apr.	S coast of Moloka'i I, Lae-o Ka Lā'au Light, N.64°30', W.23'	42	s, st
D.3849	8 Apr.	S coast of Moloka'i I, Lae-o Ka Lā'au Light, N.71°, W.21.9'	79-134	crs, s, brk, sh, co
D.3876	14 Apr.	'Au'au Channel, betw. Maui and Lāna'i I, Lahaina Light, Maui, N.60°45', E.1.6'	51-79	s, g
D.3960	22 May	Vic. of Laysan I, Laysan I Light, N.67°, E.1.5'	18	s, sh, co
D.4034	9 Jul.	Penguin Bank, S coast of O'ahu I, Diamond Head Light, N.19°, W.21.5'	26-51	fne, co, s, for
D.4063	18 Jul.	NE Coast of Hawai'i I, Kauhola Light, S.75°30', E.6.8'	91	vol, s, for, co, r
D.4128	1 Aug.	Vic. of Kaua'i I, Hanamā'ulu Warehouse, N.44°30', W.2.6'	463-124-165-327	crs, br, co, s, for
D.4159	7 Aug.	Vic. of Moku Manu (Bird I), center of Moku Manu, N.81°, E.2.0'	55-57	crs, co, s, brk, sh, for
D.4163	8 Aug.	Vic. of Moku Manu (Bird I), center of Moku Manu, N.79°30', E.20.0'	44-73	co

* br = brown, brk = broken, co = coral, crs = coarse, fne = fine, for = Foraminifera, g = gravel, r = rock, s = sand, sh = shells, st = stones, vol = volcanic.

Juxtaxanthias intonsus (Randall), new combination

Fig. 2

Xantho intonsus Randall, 1840: 113.

Lophozozymus intonsus: Rathbun 1906: 846, text-fig. 8, pl. 8, fig. 8.—Edmondson 1925: 52; 1946: 287, fig. 176e; 1962: 230, fig. 3e.

Specimens examined. HAWAIIAN IS: 1♂, O'ahu I, Kahuku, reef, shore and tidepools, 30.VI.1939 (CAS 046619); 1♂, O'ahu I, off Diamond Head, 8.VII.1945 (D.P. Abbott & C.W. Brownell) (CAS 016491); 1♂, O'ahu I, Honolulu (F.W. Weymouth) (CAS 052659).

Remarks. Species in the genera *Xanthias* Rathbun, 1897, *Juxtaxanthias* Ward, 1942, and *Lophozozymus* A. Milne Edwards, 1863, are similar in appearance. The carapace is subcircular to transversely oval, relatively flat from side to side, smooth or finely granular, and the regions are more or less areolated. The front is bilobed and often sinuous. The orbital hiatus is not closed, and the basal antennal segment just reaches the ventral prolongation of the front. The anterolateral border is convex and bears lobes or teeth; the posterior 1 or 2 lobes may have a dorsal carina. The chelae are equal or subequal, and the tips of the fingers are pointed, not hollowed.

The most obvious difference between *Lophozozymus* and the genera *Xanthias* and *Juxtaxanthias* is the sharp dorsal/anterior carina on each of the ambulatory legs of *Lophozozymus*. These carinae are well developed and occur on the 2nd through 5th pereopods, and not infrequently on the chelipeds. Species in the genera *Xanthias* and *Juxtaxanthias* do not have these carinae, but the dorsal/anterior surface of the legs may be sharp. In addition, species in *Xanthias* and *Juxtaxanthias* often have longitudinal grooves or furrows in the outer surface of the chelipeds, and the frontal orbital border of *Xanthias* is greater than ½ the carapace width. Species in *Lophozozymus* do not have furrows in the chelipeds, and the frontal orbital border is less than or equal to ½ the carapace width.

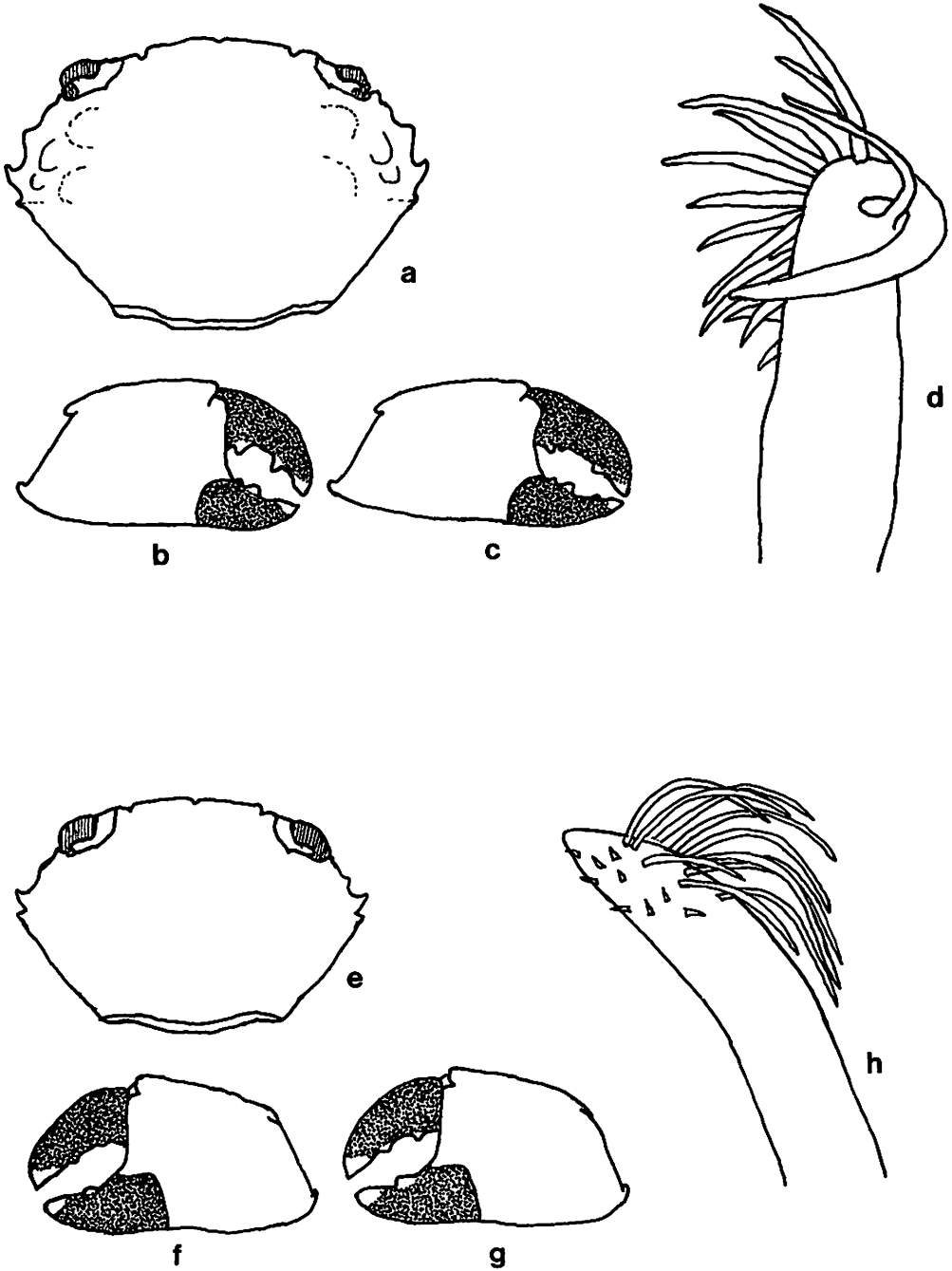


Fig. 1. a-d, *Chlorodiella cytherea*: a, carapace; b, large cheliped of ♂; c, large cheliped of ♀; d, 1st pleopod of ♂. e-h, *Chlorodiella laevissima*: e, carapace; f, large cheliped of ♂; g, large cheliped of ♀; h, 1st pleopod of ♂.

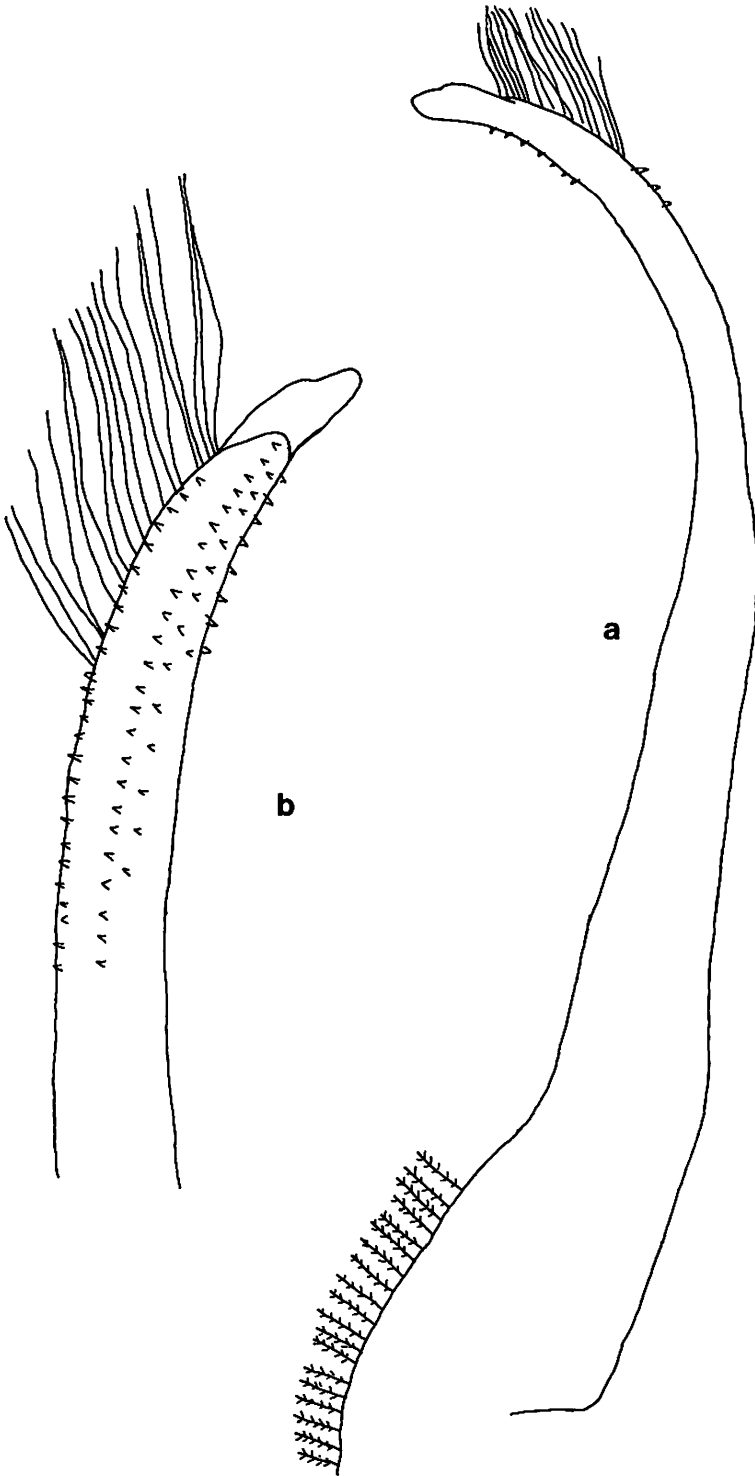


Fig. 2. *Juxtaxanthias intonsus*, 1st pleopod of ♂: a, entire pleopod; b, detail of pleopod tip.

Juxtaxanthias is close to *Xanthias*, as suggested by its name. However, in *Juxtaxanthias* the adult size is larger and the frontal orbital border is less than $\frac{1}{2}$ the width of the carapace. The anterolateral teeth have a slight dorsal inclination; the 1st tooth is anteriorly produced to approximately the level of the inner orbital angle, the most posterior tooth has a dorsal carina, and the anterior 3 teeth are separated from the more medial areolations of the carapace by a groove. The orbits have a dorsal inclination due to a strong posterior groove. The anterior/dorsal surface of the 2nd through 5th pereopods are heavily covered by long bristlelike hairs. The distal inner angle of the carpus of the chelipeds has 2 tubercles (or 1 that is widely bifurcated), the most dorsal and distal is large, thumblike, and curved upwards, and the other is smaller and has subtubercles.

Ward (1942) erected the genus *Juxtaxanthias* to include *Xantho lividus* Lamarck, 1818, and *Eudora tetraodon* Heller, 1865. Forest & Guinot (1961) did not feel that this was justified and suggested that the species remain in the genus *Xanthias*. However, as mentioned, *Juxtaxanthias* is distinguishable from *Xanthias*, and the above 2 species and *Xantho intonsus* Randall, 1840, form a species group with several common characters. *Juxtaxanthias* is therefore resurrected to include *J. lividus* (type species), *J. tetraodon*, and *J. intonsus*.

Xantho intonsus probably was placed in *Lophozozymus* by Rathbun (1906) because the anterolateral border is somewhat crested. However, the walking legs do not have carinae as in species of *Lophozozymus*. *Lophozozymus intonsus*, therefore, is transferred to the genus *Juxtaxanthias* because of its close similarity to *J. tetraodon* and *J. lividus*.

Juxtaxanthias intonsus has been reported only from the Hawaiian Islands. Forest & Guinot (1961) and Takeda (1976) reported that *J. tetraodon* also occurs in the Hawaiian Islands. The Bishop Museum has no Hawaiian records of *J. tetraodon*; however, it does have specimens from Jarvis Island (Edmondson 1951), Howland Island, Baker Island, and Guam. It is likely that only *Juxtaxanthias intonsus* occurs in the Hawaiian Islands.

Paractaea rufopunctata (H. Milne Edwards)

Xantho rufopunctatus H. Milne Edwards, 1834: 389.

Actaea rufopunctata: Rathbun 1906: 852.—Edmondson 1925: 49; 1946: 292, 294; 1962: 257, fig. 11b.

Paractaea rufopunctata forme *primarathbunae* Guinot, 1969: 248, fig. 23.

Paractaea rufopunctata forme *tertiarathbunae* Guinot, 1969: 249, fig. 24.

Paractaea rufopunctata forme *intermedia* Guinot, 1969: 250, fig. 35.

Specimens examined. HAWAIIAN IS: 1♀ (forme *primarathbunae*), O'ahu I, Punalu'u, inside dead coral blocks near shore, 5.III.1939 (CAS 052810); 1♀ (forme *tertiarathbunae*), Albatross Sta D.4128 (*Albatross* Exped.) (CAS 052598).

Remarks. Three "forms" of *Paractaea rufopunctata* have been recognized in the Hawaiian Islands, and an additional 5 "forms" have been recognized elsewhere (Guinot 1969, 1976; Serène 1984). This species complex deserves further study to determine if the "forms" are either subspecies of *Paractaea rufopunctata* or discrete species. This is necessary because the *International Code of Zoological Nomenclature* does not recognize named "forms" established after 1960.

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