

CRABS OF THE FAMILY HOMOLODROMIIDAE, VI.  
*HOMOLODROMIA MONSTROSA* NEW SPECIES (DECAPODA:  
 BRACHYURA) FROM THE WESTERN NORTH ATLANTIC WITH A  
 REDESCRIPTION OF THE HOLOTYPE OF *HOMOLODROMIA*  
*PARADOXA* A. MILNE EDWARDS, 1880 AND COMMENTS ON  
 SEXUAL DIMORPHISM

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ABSTRACT

A new species of the crab genus *Homolodromia* A. Milne Edwards, *H. monstrosa*, is described from four specimens collected in the western Atlantic. The collection consists of two females that differ markedly from descriptions of *H. paradoxa* (the only other member of the genus known from the western Atlantic) and two males that differ only slightly from *H. paradoxa*. The holotype of *Homolodromia paradoxa* A. Milne Edwards, a damaged male from the Leeward Islands, Lesser Antilles, Caribbean, is redescribed. Females of the new species differ from *H. paradoxa* males (apparently there are no known females of *H. paradoxa*) in their larger size, in the density and type of setation on the carapace and legs, in having smaller eyes relative to the carapace, and in having relatively stouter appendages. Males of the new species are similar in size and general shape to females, but differ markedly from them most notably by lacking the density and type of setation seen in the females; in this regard they are similar to males of *H. paradoxa*. Males of the new species differ from males of *H. paradoxa* mostly in the relative size of the eyes, admittedly a character that could change during ontogeny. The question of sexual dimorphism is raised as concerns these two species vs other members of the genus (notably *H. robertsi* Garth) and members of the other homolodromiid genus, *Dicranodromia* A. Milne Edwards, for both of which little or no sexual dimorphism is known.

The decapod crustacean genus *Homolodromia* was erected by A. Milne Edwards in 1880 to accommodate a single male crab collected by the U.S. Coast Survey Steamer BLAKE. This holotype, *Homolodromia paradoxa* A. Milne Edwards, was collected at a depth of 356 fathoms (651 m) 'off Nevis' in the Leeward Islands (Lesser Antilles) of the Caribbean. Subsequent to Milne Edwards's paper there have been few additional reports of *H. paradoxa* (see Guinot, 1995: 191), and only three additional species in the genus have been described: *Homolodromia bouvieri* Doflein, 1904, from off the coast of Mozambique; *H. robertsi* Garth, 1973, from the eastern Pacific; and *H. kai* Guinot, 1993, from Indonesia and New Caledonia (see Baez and Martin, 1989; Guinot, 1993, 1995). Additionally, one fossil species, *H. chanevi*, has been described from the Eocene La Meseta Formation of Antarctica (Feldmann and Wilson, 1988), and another (*H. novazealandica*) has been described from New Zealand (Feldmann, 1993).

Although there are relatively few subsequent reports of *H. paradoxa* or any other species in this family (there is but one other genus, *Dicranodromia* A. Milne Edwards, in the family) from the North Atlantic or Caribbean, several specimens labeled *H. paradoxa* exist at the U.S. National Museum of Natural History, suggesting that the species is not as rare as the literature indicates. While surveying the homolodromiid crab holdings of the U.S. National Museum in 1989, one of us (J.M.) encountered a lot containing four very

large specimens of the genus *Homolodromia*. At least two of these are so different from the holotype that they can not be attributed to *H. paradoxa*, previously the only known Atlantic species. These specimens, both females, are the basis of a new species described herein. Additionally, two males collected with the females are described as belonging to the new species, although they differ morphologically from the females. Such marked sexual dimorphism has not been recorded previously for this family. Interpretations of these morphologies are presented.

#### MATERIALS AND METHODS

The two female and two male homolodromiid crabs that form the basis of this report were collected by the RV OREGON II, sta. 10824, 07°42'N, 053°49'W (approximately 250 km NW of Paramaribo, Surinam, and 500 km ENE of Georgetown [Demerara], Guyana), western Atlantic Ocean, at a depth of 345 fa (631 m) on 27 November 1969. These were originally labeled *H. paradoxa*. In addition, two other male specimens were examined. One of these (USNM 310892, MV OREGON, sta. 3635, 16°58'N, 087°53'W, approximately 20 mi due E of Stann Creek, Belize, western North Atlantic Ocean, depth 250–400 fa, 457–732 m) was labeled *H. paradoxa*, and the other (USNM 310891, RV OREGON II, sta. 10831, 17°38'N, 063°48'W, W of Saba Island, western North Atlantic Ocean, depth 356 fa, (651 m) was not labeled. The holotype male (MCZ 6512) of *H. paradoxa* A. Milne Edwards was borrowed from the Museum of Comparative Zoology, Harvard University, Cambridge, Massachusetts.

#### SYSTEMATICS

##### Family Homolodromiidae Alcock, 1900

Genus *Homolodromia* A. Milne Edwards, 1880

*Homolodromia paradoxa* A. Milne Edwards, 1880

(Figs. 1–3)

*Synonymy*.—See Guinot, 1995: 191. Not *Homolodromia paradoxa* Takeda and Okutani, 1983: 112, photographs (= *H. monstrosa* new species, described herein).

*Material Examined*.—Holotype, MCZ 6512, male, carapace length 15.7 mm (excluding rostral horns), 356 fa (651 m), 'off Nevis', Leeward Islands, Lesser Antilles, Caribbean.

*Description*.—Male holotype carapace length 15.7 mm; other selected measurements given in Table 1.

*Carapace* (Figs. 1,2).—Inflated, more or less cylindrical in cross section. Surface smooth to minutely granulate. Scattered simple setae especially on the anterior and anterolateral regions, becoming smooth posteriorly. Rostral horns large, well developed, slightly longer and broader than anterolateral teeth. Small sharp tooth located between anterolateral tooth and rostral horn, above eyestalk in dorsal view (Fig. 2C). Minute spines and tubercles visible at higher magnification on carapace, anterolateral teeth, and rostral horns (e.g., Fig. 2B). Carapace roughly divisible into thirds by weak transverse grooves; posterior third the widest and most inflated region.

*Third Maxilliped* (Fig. 3A).—Well developed, pediform, heavily covered with small spines (especially on outer margins) and simple setae.



Figure 1. *Homolodromia paradoxa* A. Milne Edwards, 1880, male holotype (MCZ 6512), carapace, eyes, and antennae (see also Fig. 2A). Note sparse covering of simple setae, and relatively large and well pigmented eye.

*Chelipeds* (Fig. 3B–D).—Long, slender, sparsely covered with simple setae and occasional granules. Dactylus falls between tips of bifurcated propodus. Length of propodus (including fixed finger) approximately 4.2 times greatest height (measured at midlength). Fixed finger deflected downward at point where it joins palm. Carpus bearing strong, sharp laterally-directed spine near distal border, most obvious in dorsal view (Fig. 3D).

*Pereiopods 2 and 3* (Fig. 3E).—Elongate, with sparse covering of small spines and simple setae. Dactylus gently curved, with curve more pronounced in distal half, and with numerous short, sharp spines and short setae.

*Pereiopods 4 and 5* (Fig. 3F,G).—Both subchelate, with dactylus closing against and into a circlet of spines on propodal ‘thumb’. P4 and P5 oriented in opposite directions (rotated during development), with dactylus directed posteriorly in P4 but anteriorly in P5 (Figs. 3F,G). Pereiopod 4 with 5 or 6 spines on propodal thumb and with propodus

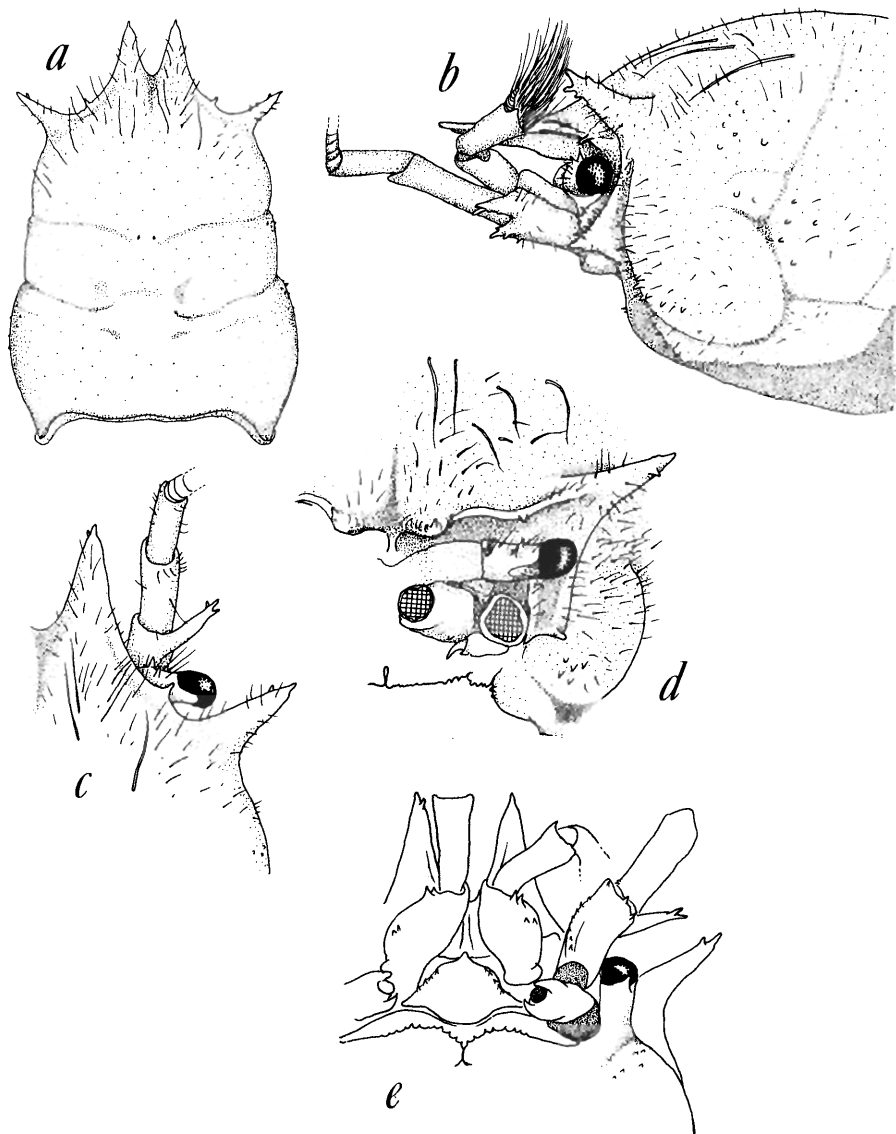


Figure 2. *Homolodromia paradoxa* A. Milne Edwards, 1880, male holotype (MCZ 6512). Selected aspects of the carapace, eyes, and antennae. a, carapace, dorsal view; b, left side of frontal region, including anterior third of carapace, eye, and antennae; c, dorsal view of right rostral horn, anterolateral tooth, eye, and base of antenna; d, frontal view of left orbit, both antenna removed (hatched areas); e, ventral view of rostral horns, bases of antennules, and left antenna and eye.

shorter relative to width than in pereopod 5 (compare Figs. 3F,G). Merus of pereopod 4 with large, acute dorsodistal tooth. Pereopod 5 with at least 8 sharp, sclerotized spines on propodal thumb opposing dactylus and another 2 or 3 at base of dactylus. Dactylus strongly curved, sclerotized in distal half, and with smaller spines along 'cutting' edge.

*Male Pleopods* (Fig. 3I,J).—First pleopod stout, bearing simple setae along entire length and tufts of longer setae distally, with narrow groove on anterior face to accommodate

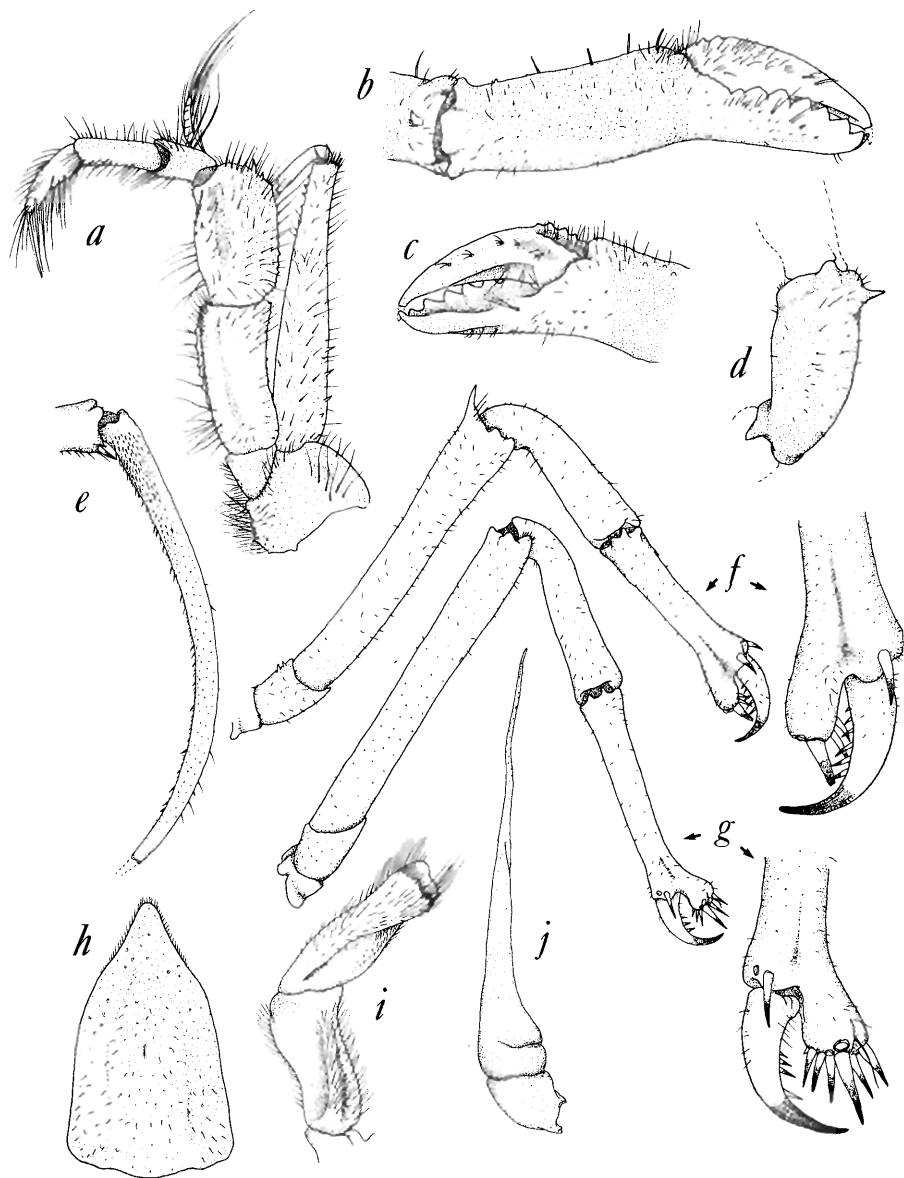


Figure 3. *Homolodromia paradoxa* A. Milne Edwards, 1880, male holotype (MCZ 6512). Selected appendages. a, third left maxilliped, outer view; b, right cheliped, frontal view of dactylus (with broken tip), propodus, and distal border of carpus with carpal spine directed outward; c, distal half of right chela, inner view; d, carpus of right chela, dorsal view; e, left pereopod 2, anterior (functionally ventral) side, tip of dactylus broken; f, right pereopod 4, posterior (dorsal) surface, with dactylus and propodal 'thumb' enlarged at right; g, right pereopod 5, posterior (dorsal) surface, with dactylus and propodal 'thumb' enlarged at right; h, telson; i, distal two segments of first pleopod; j, second pleopod.

Table 1. Comparison of measurements of selected features of the holotypes of *Homolodromia paradoxa* (male) and *H. monstrosa* (female) (USNM 310889) and the photographed male *H. monstrosa* (USNM 310890) (Fig. 6). All measurements are in mm.

	<i>H. paradoxa</i>	<i>H. monstrosa</i>	
	MCZ 6512	Holotype female	Photographed male
Carapace length*	15.7	35.5	38.6
Carapace width**	12.4	32.4	33.5
Rostral horns	2.1	2.2	3.7
(distance between tips)			
AL teeth of carapace	11.7	23.6	28.2
(distance between tips)			
Right Cheliped:			
Length of dactylus	5.7 ***	12.2	14.8
Length of propodus	11.7	25.7	32.6
Height of propodus	2.9	6.4	7.4
Left Cheliped:			
Length of dactylus	5.4	n/a	15.1
Length of propodus	12.2	n/a	30.2
Height of propodus	3.0	n/a	7.7
Pereiopod 2 (left side):			
Length of dactylus	13.5 +	n/a	25.6
Length of propodus	14.7	29.6	40.5
Length of carpus	7.8	18.4	22.5
Pereiopod 4 (right side):			
Length of dactylus	2.5	n/a	5.1
Length of propodus	6.1	n/a	16.3
Length of carpus	5.2	n/a	13.2
Telson length	7.6	28.8	20.9
Telson width #	4.5	22.8	12.8

\* measured along midline from median cleft between rostral horns to back of carapace (not including length of rostral horns)

\*\* measured at widest point, approximately four-fifths distance from front

\*\*\* right dactylus of MCZ 6512 broken at tip

+ estimated; broken at tip

# measured at widest point, which was at base of telson for males but slightly more distal for female

second pleopod. Second longer than first, corneous along distal half which bears minute spines distally.

*Abdomen* (not illustrated).—Loosely articulated, loosely folded beneath thorax. Six somites, bearing pleopods (gonopods) on somites 1 and 2 (see above) and pleopodal remnants (see Guinot, 1995: 176, fig. 5) on somites 3–6.

*Telson* (Fig. 3H).—Roughly rectangular for two-thirds length, then tapering more sharply toward blunt apex, with scattered covering of simple setae and small granules. Median third raised.

*Remarks*.—It is likely that some of the publications that have mentioned *H. paradoxa* since its original description (see papers listed in synonymy of this species given by Guinot, 1995: 191) were dealing either with the new species described herein (*H. monstrosa*) or with other undescribed species of the genus (see also Discussion). Takeda and Okutani (1983) described a rather large series of crabs (12 males and 13 females, eight of which were ovigerous) from off Suriname and French Guiana as belonging to this species, but Guinot (1995), in anticipation of the present manuscript, noted that these cannot all be

attributed to *H. paradoxa*. Our attempts to see the series of specimens mentioned by Takeda and Okutani (1983) have been unsuccessful; it is not known whether the specimens were retained or, if so, where they were archived. Based on differences (mostly in setation) observable in the photographs of Takeda and Okutani, and verified by her own examination of additional western Atlantic specimens, Guinot (1995) restricted *H. paradoxa* to the holotype and to "part of the material named as such in the literature" (from the English abstract). The other specimens or accounts that Guinot felt were without doubt also referable ["sans doute aussi" belonging] to this species were a specimen from off Cuba (375 m, OREGON Station 4371, USNM uncatalogued), part of the material mentioned by Pequegnat et al. (1971) from the Gulf of Mexico (their plate 1, fig. a), and part of the material described by Takeda and Okutani (1983: 112, photograph of the male) (none of which were seen by us). However, after careful examination of the photographs of Takeda and Okutani, we are convinced that both the subject male and female belong to the new species described herein. Thus, at present all other records of this species are in doubt as to the validity of the identification. The written description of Takeda and Okutani attempts to combine characters of both *H. paradoxa* and *H. monstrosa* (if, indeed, our interpretation of species boundaries is correct), and is incorrect concerning the setation (both plumose and simple setae are described for the male, which carries only simple setation). Therefore, that description is of little value in identification of either of the western Atlantic species of *Homolodromia*.

### *Homolodromia monstrosa* new species

(Figs. 4–7)

*Homolodromia paradoxa*.—Takeda and Okutani, 1983: 112 (photographs only).

*Material Examined*.—Holotype female, USNM 310889. RV OREGON II, sta. 10824, 07°42'N, 53°49'W (approximately 250 km NW of Paramaribo, Surinam, and 500 km ENE of Georgetown [Demerara], Guyana), western Atlantic Ocean, 345 fa (631 m), 27 Nov 1969; one of four large homolodromiids in lot. Paratype female, same lot (subsequently lost; see Remarks). Two males, identity somewhat questionable (see Discussion), same lot.

*Description of Female Holotype*.—Carapace length (excluding rostral horns, and as measured from between rostral horns to slight indentation at rear of carapace along midline) 35.5 mm. Other measurements listed in Table 1. The following description applies to both the holotype and female paratype.

*Carapace* (Figs. 4A, 5A, B).—Greatly inflated, covered with short, distally plumose setae of uniform length; setae less dense where pereopods rub against carapace (on posterolateral dorsal surfaces) and to some degree along dorsal surface of central region.

*Eyes* (Figs. 5B).—Minute relative to body size, virtually obscured in dorsal view by plumose setation along frontal region of carapace.

*Cheliped* (Figs. 4, 5C).—Fixed finger of propodus with seven blunt teeth along outer cutting border and single carinate ridge along inner border; distally bifid, accommodating tip of dactylus, which extends slightly beyond (ventral to) upcurved tip of propodus when closed. Slight dorsal / ventral constriction at approximately 2/3 length of propodus. Outer (lateral) surface of dactylus with setation mostly restricted to proximal half, be-



Figure 4. *Homolodromia monstrosa*, new species, female paratype, USNM 310890. a, dorsal view of carapace and legs; b, ventral view. Note covering of dense, plumose setae, especially obvious where it has been partially rubbed off of dorsal surface of pereopod 5 in a. Dark coloration caused in part by mud adhering to setae.

coming less dense and naked toward tip. Inner (mesial) face of dactylus naked, completely smooth, except for a few proximal setae. Propodus, carpus and merus with a nearly uniform covering of short, distally plumose setae as on carapace (Figs. 4,5C). Carpus with minute blunt lateral tooth at dorsolateral border.

*Pereopods 2 and 3.*—Dactylus long, curving strongly inward, lacking distally plumose setae that characterize other articles and other appendages but with covering of short, amber spines. Two rows of simple, spine-like setae set into longitudinal grooves along outer surface of distal third. Merus of P2 and P3 with acute spine at distodorsal border. All articles other than dactylus with uniform covering of short, distally plumose setae. Outer surface of carpus, especially that of P2, with smooth (worn?) area (with reduced or no plumose setae) at dorsal extremity.



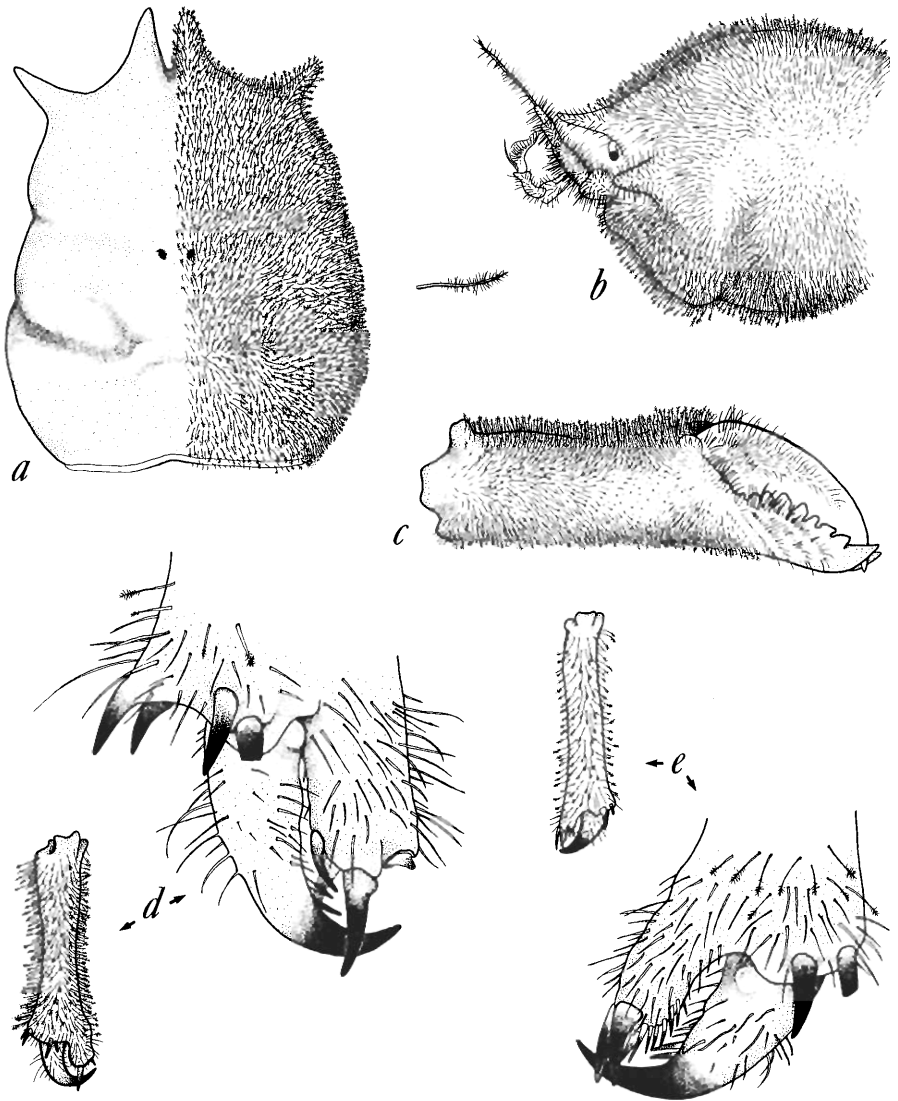


Fig. 5. *Homolodromia monstrosa*, new species, female paratype, USNM 310890. a, carapace, dorsal view, with setation on left side of carapace omitted and with individual plumose seta enlarged at right; b, antennae, eye, and anterior third of carapace, left side, drawn at slight dorsolateral angle (as compared to Fig. 2b); c, right chela, outer view; d, left pereiopod 4, dorsal view, with dactylus enlarged at right; e, left pereiopod 5, dorsal view, with dactylus enlarged at right. Note size of eye in 5b as compared to that of *H. paradoxa* in Fig. 2b–d.

*Pereiopods 4 and 5* (Fig. 5D,E).—P4 with four stout distal spines (one broken in Fig. 5B, left side) on propodal ‘thumb’ of chela and with four stout spines surrounding base of dactylus. Dactylus with three subterminal spines along ventral border. Dactylus closing over propodus and extending slightly beyond it. Plumose setation more or less uniform along length of appendage, yielding to more simple setae toward chela. P5 similar but



Figure 6. *Homolodromia monstrosa*, one of two males collected with female holotype. a, dorsal view; b, ventral. Note size is roughly equivalent to that of female holotype of *H. monstrosa* (compare to Fig. 4a,b), but setation is longer, individual setae are not plumose, and pereopods are more slender.

with more spines along opposing edge of propodal 'thumb' and with only two stout spines surrounding base of dactylus. Dactylus of P4 and P5 pointing in opposite directions (as with genus). Plumose setation less dense to absent along functionally dorsal region of carpus and merus of P5 (Fig. 4a).

*Third Maxillipeds*.—Well developed, slightly pediform (but obviously flattened) and densely covered by short, plumose setae obscuring other features.

*Abdomen*.—Large, loosely articulated, composed of six somites plus telson. Somite 1 with pair of short uniramous pleopods. Somites 2–5 each with pair of larger, biramous, multiarticulate and setose pleopods. Somite 6 with pleopodal remnant only.

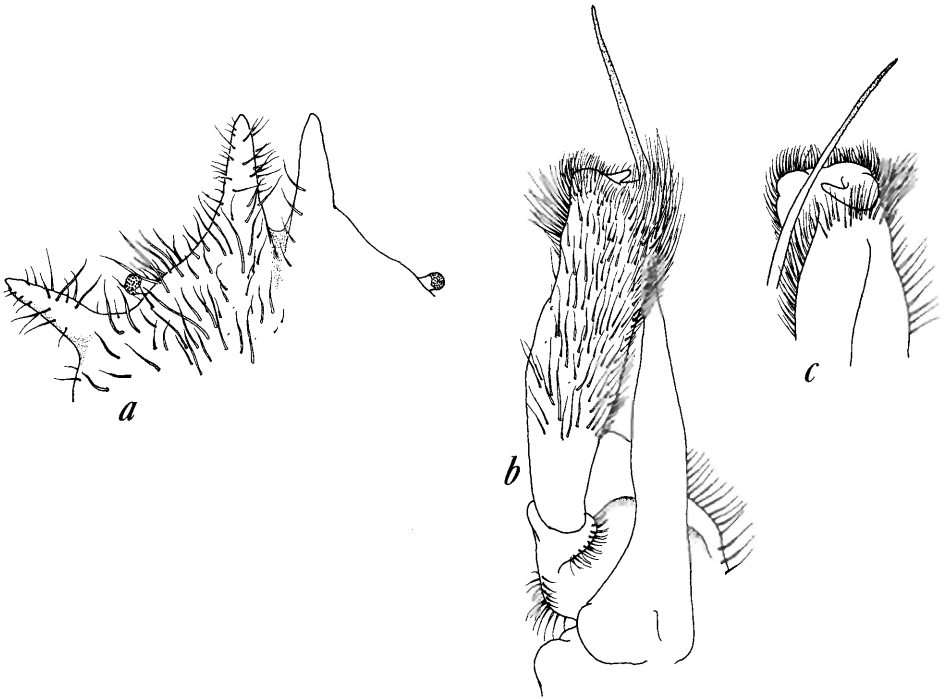


Figure 7. Male *H. monstrosa*, new species (same individual as in Fig. 6). a, front region of the carapace, right side, with setation omitted. Note size of eye relative to spines (compare to Figs. 1, 2 for *H. paradoxa* male). b, first pleopod (gonopod), anterior view. c, tip of first pleopod in posterior view. Note small curved protrusion.

*Telson*.—Extremely long (28.8 mm) and wide (22.8 mm), very strongly concave on inner surface to accommodate egg mass (although neither holotype nor paratype female carrying eggs), densely covered with short, distally plumose setae and fringed with longer setae, some of which are not plumose distally. Tip narrowing to conical extremity. Low, smooth, median external (functionally ventral) ridge along proximal half.

*Etymology*.—From the Latin *monstrum*, for abnormal or supernatural wonder (monster), in reference to the size of this species compared to others in the family.

*Remarks*.—The female paratype featured in Figures 4 and 5 was lost subsequent to its examination. Therefore, the above description pertains to female holotype and paratype (measurements are for holotype), but the photographs (Fig. 4) and illustrations (Fig. 5) are based on the lost female paratype. The lot containing the two females described above also contained two males (Figs. 6, 7). It would seem likely that these are males of the same species, given their proximity (identical depth, habitat, etc.), and because it seems unlikely that a dredge would collect females of one species in close proximity to males of another. Yet these males differ from the females in some significant characters, most obvious of which is the density and type of setae covering the carapace and appendages. The males have simple (nonplumose) setae. In fact, these males are morphologically similar to previous descriptions of *H. paradoxa* males, although they are much larger than any previously mentioned specimen of *H. paradoxa*, and in fact are more than twice the size of the holotype (see Table 1). Males of *H. monstrosa* and *H. paradoxa* also differ in

that the former have very small eyestalks and corneas relative to overall body size, and a cornea that is only weakly pigmented (compare Fig. 7A to Figs. 1,2C). Males of *H. monstrosa* also have a slightly more complex distal armature on the first pleopod (Fig. 7B,C), a blunt lateral antennal spine that does not bifurcate distally, and a smaller outer carpal spine on the cheliped relative to size of the carpus. In addition, they lack the small spine on the anterolateral carapace border between the rostral tooth and the anterolateral tooth (Fig. 1A,C). Alternative interpretations of this apparent sexual dimorphism and differences between males of the species are discussed below.

Both males and females were excessively dirty, the plumose setae (or simple setae in the case of the males) of the carapace and appendages having trapped a large amount of flocculent mud, from which we surmise a soft bottom environment as the habitat.

## DISCUSSION

In the new species, *H. monstrosa*, males (Fig. 6) and females (Figs. 4,5) exhibit extreme dimorphism compared to other members of the family. Males (but not females) rather closely resemble the males of *H. paradoxa* but are much larger. This dimorphism is consistent with the treatment of specimens collected off Suriname and French Guiana by Takeda and Okutani (1983) and in the Gulf of Mexico by Pequegnat et al. (1971). Takeda and Okutani (1983) showed color photographs of morphologically different males and females of the genus *Homolodromia* (Takeda and Okutani 1983: 112). From study of their photographs, and because our four specimens of *H. monstrosa* came from the general proximity of the Takeda and Okutani collections, we conclude that these are males and females of *H. monstrosa*. Takeda and Okutani (1983) likely elected to treat them as males and females of *H. paradoxa* as this was the only member of the genus known from the western Atlantic at that time. A similar approach was taken by Pequegnat et al. (1971), where again two very different looking crabs are illustrated and labeled male and female of *H. paradoxa*.

In their examination of one of the largest series of any species of the Homolodromiidae, Baez and Martin (1989) noted that among 13 specimens (five males, eight females) of *H. robertsi* Garth collected off the coast of Chile, males and females were "similar in size and bodily proportions" (Baez and Martin 1989: 497). Setation, concerning both density and the type of setae, is also identical in males and females of *H. robertsi*. Unfortunately, only males are known for *H. bouvieri*. In the Indo-Pacific *H. kai*, both sexes are known and are not sexually dimorphic. Because of the rareness of the homolodromiids in general, new species have been proposed from time to time on the basis of very few specimens. Occasionally, differences in setation are among the key characters used to establish a new species (e.g., see treatment of the genus *Dicranodromia* in Guinot, 1995). Current taxonomy may have to be reexamined if it should be concluded that sexual dimorphism is more common than was previously thought.

Resolution of the above questions may be slow in coming. Confirmation will probably depend on collection of larger reference series of crabs from various localities, and/or molecular/genetic evidence from fresh specimens.

*H. monstrosa*, the holotype of which is 35.5 mm long (CL) (and the paratype of which was 43.3 mm long), is a species characterized by very large individuals for the family, similar in size to the largest previously known specimen of *H. robertsi* (a female measur-

ing CL 43.2 mm). Because of similarities in size and setation (*H. robertsi* has distally plumose setae covering the carapace and appendages in both sexes), *H. monstrosa* may be an Atlantic analog of *H. robertsi*, which occurs along the west coast of South America (Baez and Martin, 1989).

#### ACKNOWLEDGMENTS

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#### ADDENDUM

The following specimens collected by the RV OREGON II and in the collections of the USNM, currently without catalog numbers, were found to conform to the description of *H. monstrosa* and are also designated as paratypes:

- RV OREGON II, Station 10603, 1 ovigerous female
- RV OREGON II, Station 10807, 2 females
- RV OREGON II, Station 10808, 1 female
- RV OREGON II, Station 2011, 2 females (1 ovigerous)