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DESCRIPTION OF A NEW FRESHWATER CRAB OF THE GENUS
SESARMA SAY, 1817 (BRACHYURA, GRAPSIDAE, SESARMINAE) FROM
WESTERN JAMAICA

BY

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ABSTRACT

A new freshwater crab, *Sesarma dolphinum* sp. n., is described from Jamaica. The number of known Jamaican endemic Sesarminae increases thereby to eight. Half of the American species of *Sesarma* known at present are endemic to Jamaica. The new species is locally restricted to the slopes of the Dolphin Head Mountain in western Jamaica. It probably evolved when sea-level fluctuations during the Pliocene isolated this mountain from Central Jamaica. *Sesarma dolphinum* is closely related to *Sesarma fossarum* Schubart, Reimer, Diesel & Türkay, 1997, but differs in the morphology of the chelipeds, in the degree of pubescence, and in morphometric relationships.

ZUSAMMENFASSUNG

Eine neue Süßwasserkrabbenart, *Sesarma dolphinum* sp. n. von Jamaica wird beschrieben. Die Zahl der bekannten endemischen jamaikanischen Sesarminae erhöht sich auf acht. Die Hälfte der beschriebenen amerikanischen *Sesarma*-Arten kommen endemisch auf Jamaika vor. Die Verbreitung der beschriebenen Art ist auf die Hänge des Dolphin Head in Westjamaika begrenzt. Wahrscheinlich ist sie aufgrund von Meeresspiegelschwankungen während des Pliozäns, die diesen Berg von Zentraljamaika isolierten, entstanden. *Sesarma dolphinum* ist mit *Sesarma fossarum* Schubart, Reimer, Diesel & Türkay, 1997 nah verwandt, unterscheidet sich aber in der Morphologie der Schere, im Behorstungsgrad und morphometrischen Beziehungen.

INTRODUCTION

Jamaica is the only Caribbean island for which endemic grapsid crabs have been reported. Apart from the varunine crab *Glyptograpsus jamaicensis* (Benedict, 1892), all other species belong to the subfamily Sesarminae Dana, 1851, viz., *Sesarma bidentatum* Benedict, 1892, *S. cooki* Hartnoll, 1971, *S. fossarum* Schubart, Reimer, Diesel & Türkay, 1997, *S. jarvisi* Rathbun, 1914, *S. verleyi* Rathbun, 1914, *S. windsor* Türkay & Diesel, 1994, and *Metopaulias depressus*

Rathbun, 1896 (see also Abele, 1992; Abele & Means, 1977; Chace & Hobbs, 1969; Hartnoll, 1964).

Detailed studies of the Central Jamaican material previously identified as *Sesarma windsor* Türkay & Diesel, 1994, had recently resulted in the recognition of a second species, *S. fossarum* (see Schubart et al., 1997). Studying the material of *Sesarma windsor* from western Jamaica, we are now able to distinguish another new species within this complex of freshwater riverine crabs. Independent from our morphological study, crabs from the Dolphin Head have been shown to possess a distinct genotype with regards to a fragment of their 16S mt-DNA sequence (Schubart et al., unpublished data).

Type specimens have been deposited in the collections of the Senckenberg-Museum, Frankfurt a.M. (SMF), the National Museum of Natural History, Washington, D.C. (USNM), and the Museum für Naturkunde, Berlin (ZMB).

Abbreviations and measurements. — cw: carapace width, greatest distance at posterior part of carapace; cl: carapace length, distance between median part of front and posterior carapace margin; ph: propodus height of palm, measured as the maximal height; pl: propodus length of chela, measured ventrally. Other measurements: length of exo-orbital tooth, distance from tip of exo-orbital tooth to notch anterior to epibranchial tooth. Maximal length of the merus of the 4th pereopod was measured dorsally, while the total length (ischium to dactylus inclusive) was measured ventrally.

SYSTEMATIC ACCOUNT

Sesarma dolphinum sp. n. (figs. 1-4)

Material examined. — Holotype: male (cw by cl: 25.3 by 21.44 mm) (SMF 23304), Jamaica, Hanover, tributary to Hog River-Davis River system, between Paradise Great House and Kingsvale (18°32'N 78°13'W), 19.iii.1995, leg. R. Diesel, C. D. Schubart. Paratypes: 2 males (26.24 by 22.14 mm, 22.18 by 18.73) (SMF 19576, 19577), Jamaica, Hanover, Dolphin Head, Askenish, tributary to Lucea West River system (18°33'N 78°09'W) 1.xii.1989, leg. R. Diesel (originally paratypes of *Sesarma windsor* Türkay & Diesel, 1994); 1 male (23.07 by 19.39 mm) and 1 female (20.4 by 17.29 mm) (USNM 284155), same locality as SMF 19576 and 19577, 15.ii.1993, leg. R. Diesel, G. Bäurle, C. D. Schubart; 1 male (20.86 by 17.0 mm) (ZMB 27210), same locality as holotype, 19.iii.1995, leg. R. Diesel, C. D. Schubart; 4 males (18.76 by 15.65 mm, 21.82 by 18.31 mm, 21.06 by 17.95 mm, 21.19 by 18.18 mm) and 1 female (15.65 by 12.93 mm) (SMF 23305), Jamaica, Hanover, tributary to Flamstead River, next to road between Kingsvale and Grange Hill (18°03'N 78°13.5'W), 23.iii.1996, leg. R. Diesel, R. Palmisano, J. Reimer, C. D. Schubart.

Other material (in R. Diesel's collection). — 1 male (17.22 by 14.56 mm), same locality as holotype, 23.iii.1996, leg. R. Diesel, R. Palmisano, J. Reimer, C. D. Schubart; 1 male (16.36 by 14.19 mm) and 2 females (19.23 by 16.19 mm, 17.23 by 14.61 mm), Jamaica, Westmorland, Roaring River, tributary to Caharita River (18°17'N 78°03'W), 19.iii.1995, leg. R. Diesel,

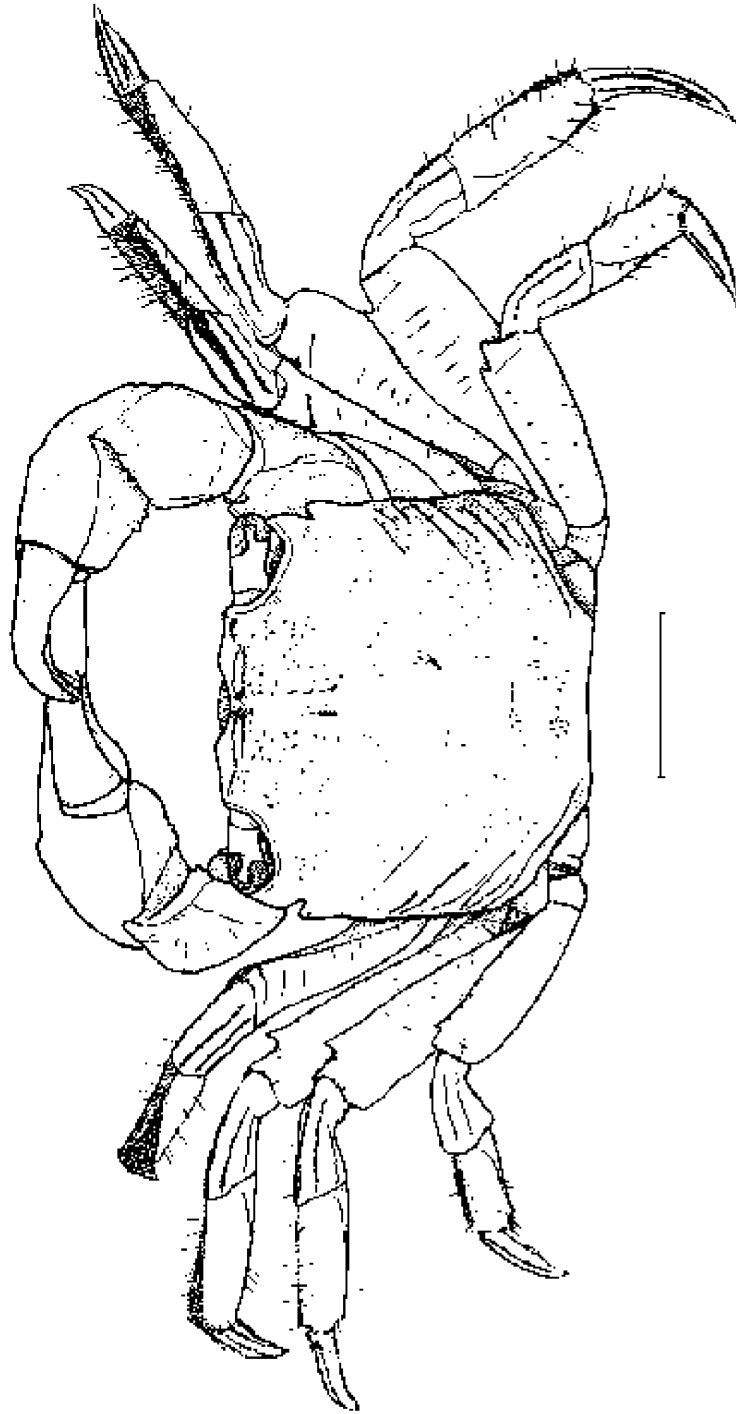


Fig. 1 *Sesarma dolphinum* sp. n., male (holotype); tributary to Hog River-Davis River, Hanover, Jamaica. Scale bar 1 cm.

C. D. Schubart; 1 male (16.44 by 13.81 mm) and 2 juvenile females (14.35 by 12.18 mm, 12.49 by 10.45 mm), same locality as SMF 23305, 23.iii.1996, leg. R. Diesel, R. Palmisano, J. Reimer, C. D. Schubart.

Etymology. — The new species name is derived from its locality on the isolated mountain "Dolphin Head" in western Jamaica. The name is adjusted to the neuter gender of the generic name *Sesarma*.

Diagnosis. — Carapace broader than long, dorsal surface with scattered tufts of pubescence. One epibranchial tooth. Palm of chelipeds with a continuous row of granules on upper margin, median part of outer face with a distinct longitudinal bulge in larger individuals; inner face swollen, with dorsal row of granules appearing to be displaced towards outer face; pollex tapers to its distal end, resulting in a great gap between the closed fingers; dactylus slender, deflexed, upper margin proximal with maximal 4 poorly developed tubercles. Walking legs with strong short pubescence, propodus and dactylus with many additional long setae.

Description. — Measurements of studied material: male cw: 16.4-26.2 mm; cl: 14.2-22.1 mm; female cw: 17.0-23.2 mm; cl: 14.6-19.6 mm. Carapace broader than long (cl : cw = 0.84 ± 0.001), greatest width at posterior angles. Distinct epibranchial tooth at lateral carapace border behind short exo-orbital tooth (fig. 2c, table I); a small dent marks the rudimentary second epibranchial tooth. Carapace dorsal surface with numerous tufts of pubescence. Branchial regions with oblique striae fringed by setae. Interorbital region subdivided into four frontal lobes (fig. 1); lateral lobes half width of median lobes; posterior lobes reduced; median lobes with tuft of strong setae on median angles directed medially forming a V-shaped "roof" above groove between median lobes (fig. 2a). Mesogastric region delimited, other regions less distinct. Lateral border of carapace ending shortly before ventral border, at height of third walking leg (fig. 2b).

Posterior border of orbit directed strongly postero-laterally (fig. 2c); border with row of granules running into orbit. Suborbital border setose; setae in orbit behind eyestalk (fig. 2d). Eyes pigmented, cornea thicker than eyestalk; eyestalk with 3 or 4 sets of setae; with some small rows of granules proximally (fig. 2e).

Epistome and proepistome setose, with two distinct swellings. Interior row of setae fringing Verwey's groove reduced to few setae; exterior row of setae running from tip of lower epistomial edge to ventral border of epistome; border with endostomial cristae; transverse suture between epistome and proepistome sunken medially (fig. 2f).

Chelipeds homochelous, sexually dimorphic; larger in males. Inner face of merus of cheliped oval with two longitudinal rows of setae; lower one continuous over full length; upper one interrupted, not reaching distal end of merus;

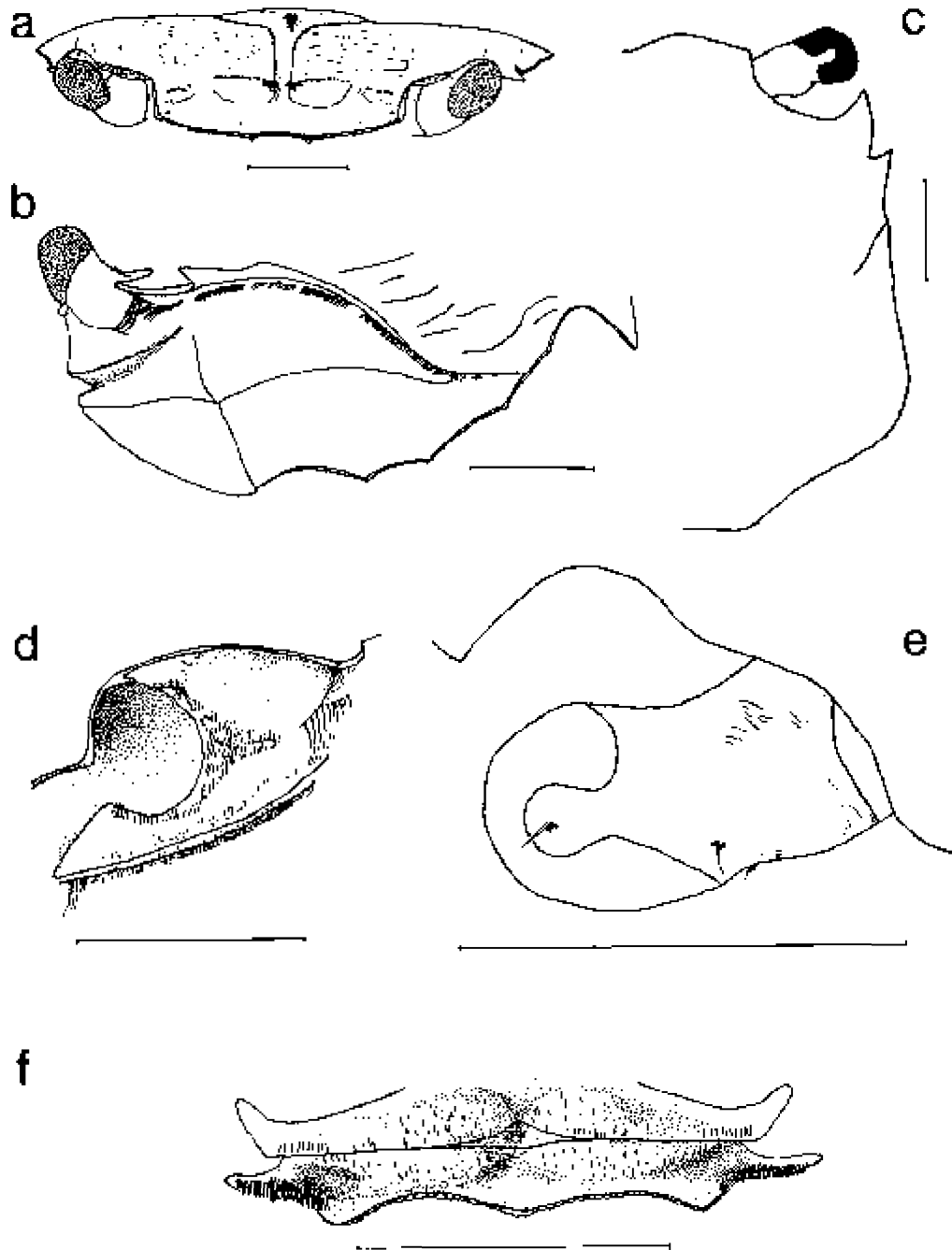


Fig. 2. *Sesarma dolphinum* sp. n., male (holotype except d). a, frontal view of carapace; b, lateral view of carapace; c, dorsal view of right carapace margin; d, frontal view into the left orbit (eyestalk ablated); e, dorsal view of right eye; f, frontal view of proepistome and epistome with Verwey's groove. Scale bars 0.5 cm.

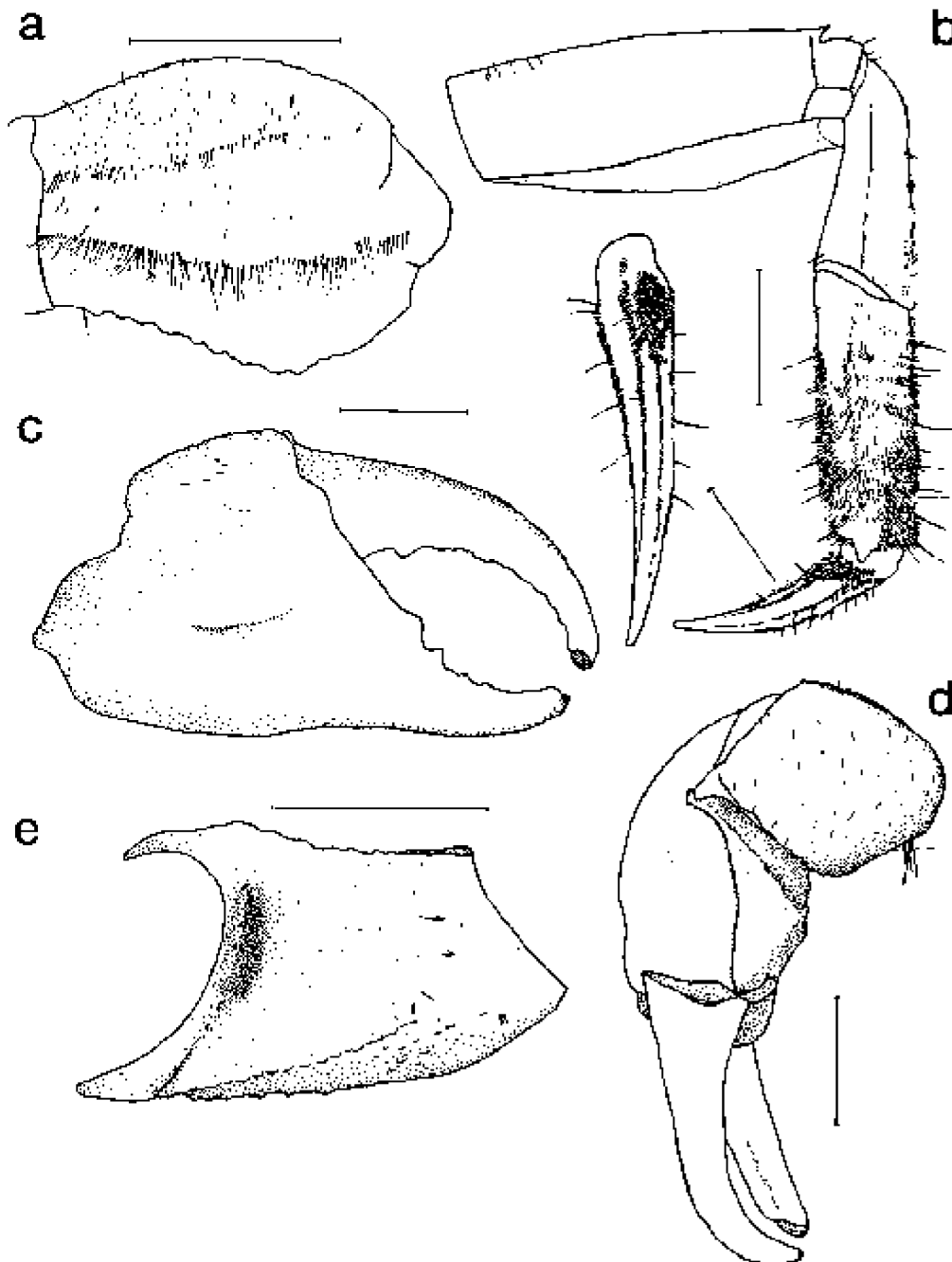


Fig. 3. *Sesanna dolphinum* sp. n., male (holotype). a, interior face of merus of left cheliped; b, anterior side of 3rd pereopod; c, outer face of right male chela; d, dorsal view of right male cheliped (carpus, propodus, and dactylus); e, ventral face of merus of right cheliped. Scale bars 0.5 cm.

TABLE I

Comparison of morphometric relationships between *Sesarma fossarum* Schubart et al., 1997 and *Sesarma dolphinum* sp. n. (including exuviae from individuals not listed above) from western Jamaica. All samples were tested by means of a non-parametric Mann-Whitney *U*-test. Values represent means, standard deviations, and sample size

	<i>S. fossarum</i>	<i>S. dolphinum</i> sp. n.	<i>P</i>
	$\bar{x} \pm \text{SD (N)}$	$\bar{x} \pm \text{SD (N)}$	
Carapace length/width	0.87 \pm 0.01 (46)	0.84 \pm 0.01 (24)	<0.0001
Exo-orbital tooth length/carapace length	0.16 \pm 0.01 (44)	0.13 \pm 0.01 (23)	<0.0001
4th pereopod length/carapace length	1.91 \pm 0.05 (39)	2.1 \pm 0.1 (22)	<0.0001
4th pereopod menis length/width	2.43 \pm 0.15 (46)	2.65 \pm 0.15 (24)	<0.0001
Male propodus height/carapace width	0.47 \pm 0.02 (30)	0.43 \pm 0.04 (12)	0.0075
Female propodus height/carapace width	0.31 \pm 0.02 (13)	0.34 \pm 0.02 (11)	0.0028
Male propodus height/length	0.61 \pm 0.01 (30)	0.58 \pm 0.02 (12)	0.0012
Female propodus height/length	0.52 \pm 0.01 (13)	0.54 \pm 0.01 (11)	0.0019

below lower row of setae, a few long, fine setae proximally (fig. 3a); ventral face transversely triangular, glabrous, smooth; transverse bulge with less than ten granules before distal border (fig. 3c). Carpus almost quadrangular; interior margin bends abruptly downwards; interior face proximally with tuft of grooming setae. Dorsal margin of palm with continuous row of granules slightly displaced to outer face; inner face with large tubercles, partially dorsal in position, so inner dorsal margin triangularly enlarged (fig. 3d); outer face with short longitudinal bulge medially (distinct only in larger individuals); pollex tapers distally. Dactylus remarkably slender, distinctly deflexed, resulting in a large oval gap between closed fingers of chela (fig. 3c); dorsal margin usually without row of tubercles, occasionally with 2-4 proximal poorly developed tubercles (fig. 3d).

Walking legs with dense pubescence. Second walking leg with entire anterior face of propodus setose, carpus with setae along outer margin. Longitudinal row of granules on anterior face of carpus fringed with tufts of pubescence. Dactylus and propodus with many additional long setae. Dactylus proximal with pubescence between six longitudinal rows of setae (fig. 3b).

Thoracic sternites smooth, glabrous, with scattered single setae. Suture between male sternite VII and episternite VII does not reach margin of pleon (see arrow on fig. 4a). Third pleon segment in males broadest, lateral borders convex; fourth segment broader posteriorly; lateral borders concave; fifth and sixth segments narrowing posteriorly; lateral borders convex; telson much narrower at base than base of last pleon segment (fig. 4a).

Male first gonopod slender, horny apex slightly longer than broad; distal part slightly bent laterally (fig. 4b-d)

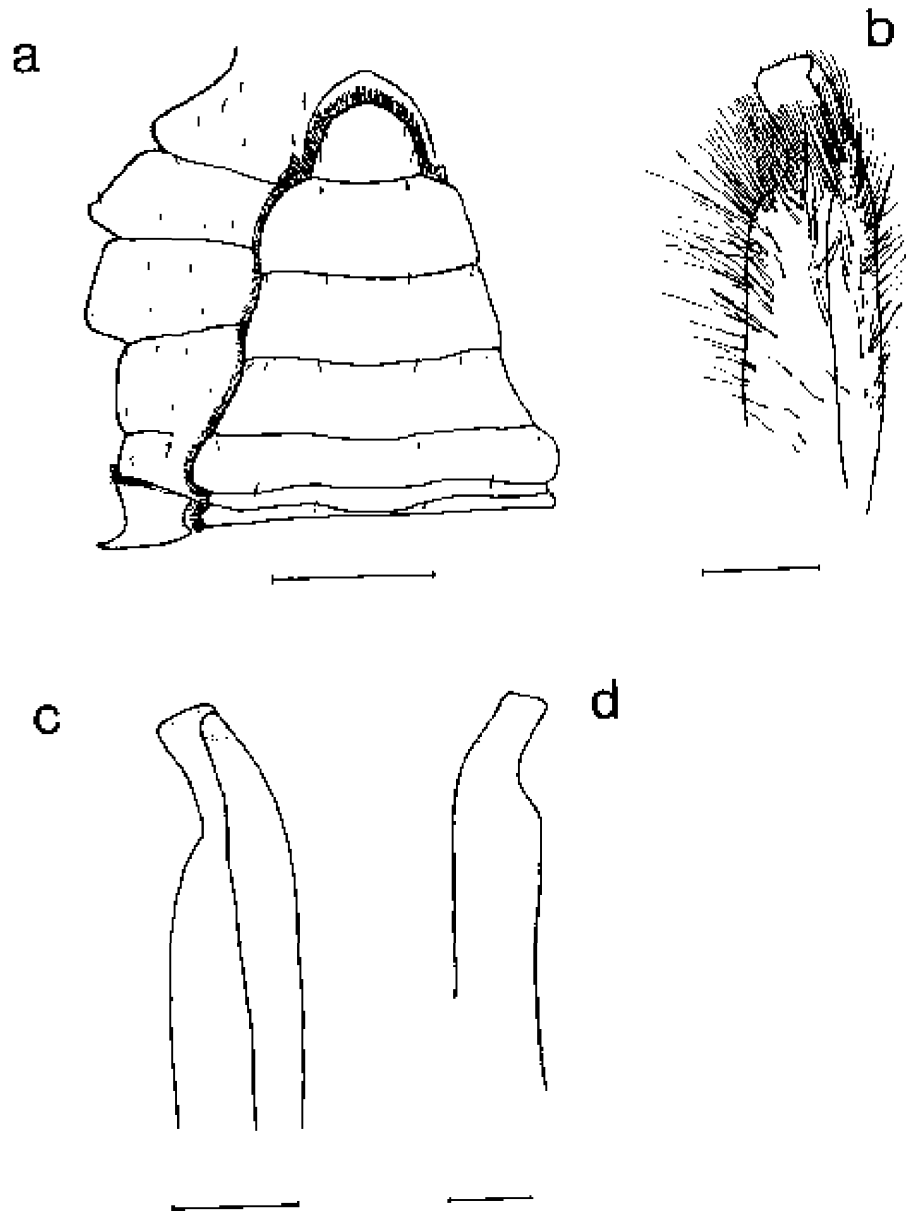


Fig. 4. *Sesarma dolphinum* sp. n., male (holotype). a, male pleon and sternites (arrow showing the suture between sternite VII and episternite VII); b, distal end of left male gonopod, mesio-ventral view; c, left male gonopod, mesio-ventral view (denuded); d, left male gonopod, dorsal view (denuded). Scale bars 0.5 cm.

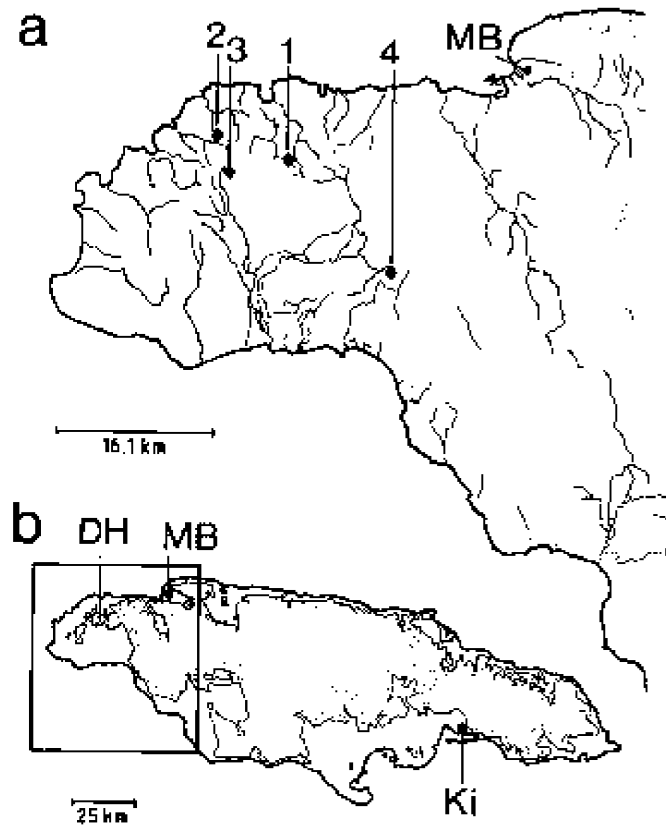


Fig. 5. Map of Jamaica showing the localities where *Sesarma dolphinum* sp. n. was found. a, general map showing altitude contours at 152.4 m (500 feet) (straight line) and 304.8 m (1000 feet) (dotted line); b, map section showing watersheds of western Jamaica and localities of *S. dolphinum* sp. n.: 1, Askenish, Hanover; 2, tributary to Hog River, Hanover; 3, tributary to Flamstead River, Hanover; 4, Roaring River, Westmorland. Straight line, permanent river; dotted line, seasonal river; DH, Dolphin Head; MB, Montego Bay; Ki, Kingston.

Colour in life. — *Sesarma dolphinum* has a light brown ground colour, gradually becoming darker anteriorly. Outer face of propodus and dactylus of chelipeds dull orange.

Distribution. — *S. dolphinum* is so far only known from western Jamaica and was found at four different localities where water drains from the slopes of the isolated Dolphin Head mountain (fig. 5b).

Habitat. — *S. dolphinum* inhabits freshwater and ephemeral creeks, burrowing in banks like *S. fossarum* and *S. bidentatum*.

DISCUSSION

With the present description of *Sesarma dolphinum* sp. n., the number of Jamaican endemic Sesarminae increases to eight. *Sesarma dolphinum* is similar to *S. fossarum*, *S. windsor*, and *S. bidentatum* but can be easily distinguished from these species by the absence of a continuous row of tubercles on the dactylus of the chela. The species geographically closest to *S. dolphinum* is *S. fossarum* which occurs in the western Cockpit Country, a locality east of the type locality of *S. dolphinum* (see Schubart et al., 1997). Morphometric differences between these similar species are summarized in table 1. The most evident differences are in the relatively broader carapace, longer and more slender legs, and a less pronounced sexual dimorphism of the chelipeds in *S. dolphinum* (ph : cw in males 1.26 times larger as in females, ph : pl in males 1.07 times larger as in females) compared to *S. fossarum* (ph : cw in males 1.52 times larger as in females, ph : pl in males 1.17 times larger as in females). The three specimens of *S. dolphinum* from Roaring River (Westmorland) differed from the other material of the species by having shorter legs (4th pereopod length/carapace length: 1.91 ± 0.06). In these specimens, the dorsal row of granules on the palm of the chela is not always continuous and the number of tubercles on the dactylus of the chela varied between 0 and 4. These specimens might possibly be a distinct subspecies, but further material will be needed for confirmation. In any case, the 16S mt-DNA sequence of this population was identical to that of the population from northern Dolphin Head (Schubart et al., unpublished data).

The egg-size (in diameter) and number of eggs per ovigerous female of *Sesarma dolphinum* (1.33 mm; 165-267) are similar to those parameters for *S. bidentatum* (1.33 mm; 155-302) and *S. fossarum* (1.38 mm; 106-457) (Diesel & Schuh, unpublished data). Larval development has not been studied, but it is probably abbreviated, as indicated by the large yolk reserve in the eggs. In other sesarminae crabs with large eggs and yolk reserves (*Geosesarma perracae* (Nobili, 1903), *Metopaulias depressus*, *Sesarma jarvisi*), the larval development is abbreviated (Soh, 1969; Hartnoll, 1964; Diesel & Schuh, 1993; Diesel & Horst, 1995), or even direct (*Geosesarma notophorum* Ng & Tan, 1995).

The present new species provides further evidence of the sesarminae radiation on Jamaica. A prerequisite for this radiation was probably the absence of freshwater crabs of the family Pseudothelphusidae present on most other Caribbean islands (Chace & Hobbs, 1969; Hartnoll, 1964). Furthermore, the geological history of Jamaica (Porter, 1990) favoured allopatric speciation. In the case of *Sesarma dolphinum*, it seems probable that the Dolphin Head Mountain, belonging to the Hanover Blocks, was repeatedly isolated from Central Jamaica (Clarendon Blocks) because of changing sea-levels during the Pliocene and Pleistocene

(Haq et al., 1987; Hedges, 1989; Pregill & Olson, 1981). Hedges & Burnell (1990) attribute species divergence events in Jamaican *Anolis* lizards to the increased sea level during the Early Pliocene, assuming that the formation of additional islands isolated populations and made evolution of new species possible. In other taxonomic groups, there are also several species which are endemic to the Dolphin Head region. Hedges (1989) recognized two frogs of the genus *Eleutherodactylus*, viz., *E. grabhami* Schwartz, 1973, *E. luteolus* Gosse, 1851, confined to the Hanover Blocks. The lizard *Sphaerodactylus oxyrinus oxyrinus* Gosse, 1850, is also restricted to the western block (Schwartz & Henderson, 1991). Adams (1972) found three endemic species within the family Bromeliaceae (*Hohenbergia brittoniana*, *H. distans*, *H. negrilensis*), while Kelly (1991) recorded 23 species of endemic plants from this region. Among the gastropods, *Pleurodonte oxytenes* Pilsbry, 1889 (see Farr, 1990 (as *P. oxytenes*)), *P. schroeteriana* (Pfeiffer, 1845) (see Goldberg, 1994; Henderson, 1894) and some species and subspecies of cyclophorid operculate land molluscs (see Bartsch, 1942) are endemic to the Dolphin Head region. This evidence supports the hypothesis that this region has been relatively isolated during the geological history of Jamaica.

At present, a natural barrier exists for freshwater animals between Dolphin Head (Hanover Blocks) and Central Jamaica (Clarendon Blocks), with the watersheds of these two regions being clearly separated (fig. 5b). The Early Pliocene separation of Dolphin Head as a distinct island and a presently continuing geomorphological separation in terms of watersheds probably resulted in the isolation and subsequent speciation of *Sesarma dolphinum*.

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