

**A new species of the shrimp genus
Chorocaris Martin & Hessler, 1990
(Crustacea: Decapoda: Bresiliidae) from hydrothermal
vent fields along the Mid-Atlantic Ridge**

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Abstract. — A new species of the caridean genus *Chorocaris* Martin & Hessler, *C. fortunata*, is described from the Lucky Strike hydrothermal vent field along the Mid-Atlantic Ridge in the vicinity of the Azores. The new species differs from the two previously known members of the genus in having an acute conical prominence on the lower angle of the orbit (antennal spine); this spine and the rostrum extend further anteriorly than the anteriormost border of the pterygostomial and ventrolateral region of the carapace. Additional differences include a more stout cheliped, narrower scaphognathite, longer chela on the second pereopod, and a much smaller size at maturity.

The caridean shrimp genus *Chorocaris* was established by Martin & Hessler (1990) to accommodate *C. vandoverae*, a small shrimp collected at hydrothermal vent sites in the Mariana Back-Arc Basin, western Pacific. In addition to *C. vandoverae*, Martin & Hessler (1990) also transferred one Atlantic species of vent shrimp, *Rimicaris chacei* Williams & Rona, 1986, to *Chorocaris*. Thus, prior to the current paper there were two recognized species in the genus, with a biogeographically interesting distribution, one known from vent sites in the western Pacific, the other from vents along the Mid-Atlantic Ridge.

In June 1993, collections were made using the submarine DSRV *Alvin* at several vent sites along the Mid-Atlantic Ridge near the Azores. Among the species collected on this cruise were several specimens of a small new species of *Chorocaris*, which we describe herein.

Materials and Methods

Shrimp were collected during a series of dives on the American Lucky Strike Cruise (DSRV *Alvin* and R/V *Atlantis II*, Chief Scientist C. Langmuire, May 27–June 4, 1993, Lucky Strike hydrothermal field, 37°17'N, 32°16'W, 1624–1700 m depth). Although additional specimens from other dives exist in the collections of various researchers (e.g. C. L. Van Dover, currently at the Duke University Marine Laboratory, Beaufort, North Carolina), all specimens used in this report came from DSRV *Alvin* Dive 2607, 2 Jun 1993, 1624 m. In addition to the new species, *Chorocaris chacei* was also present at this site. The material, all of which has been deposited in the Natural History Museum of Los Angeles Count (LACM), with the exception of 5 paratypes sent to the Muséum national d'Histoire naturelle, Paris, and to the University of Lisbon, Portugal,

consisted of 71 individuals ranging in size from 3.8 mm to 9.4 mm in carapace length (CL) and from 12.0 mm to 33.1 mm total length (TL).

Chorocaris fortunata, new species

Figs. 1–3

Holotype.—Female, ovigerous, CL 9.7 mm, TL 30.2 mm. LACM 93-45.1. DSRV *Alvin* Dive 2607, Vent Site 3 (Sintra Site), Lucky Strike hydrothermal vent, 1624 m, 2 Jun 1993, Azores (37°17.6'N, 32°16.5'W).

Paratypes.—70 specimens (including 17 ovigerous), LACM 93-45.1 (21 specimens) and LACM 93-45.3 (49 specimens, ten of which were later removed for depositing in the French and Portuguese institutions). Same collection data as for holotype. One specimen, CL 8.5 mm, Lucky Strike vent field, 14 Sep 1992 (not included in range of sizes given below).

Additional material (non-paratype).—2 specimens from a collection of 10 individuals ranging in size from approximately TL 27 mm to 18 mm; 2 of the 10 specimens were ovigerous. Broken Spur vent site, DSRV *Alvin* Dive 2624, approximately 29°10'N, 43°10'W, 26 Jun 1993, 3044 m (Dr. Eve Southward, Marine Biological Association of the United Kingdom, Citadel Hill, Plymouth, England, pers. comm.).

Diagnosis.—*Chorocaris* Martin & Hessler, 1990, with acute, conical suborbital tooth (antennal spine) that, together with blunt rostrum, extends anteriorly beyond the anteriormost extension of the carapace. Chelipeds short, robust, propodus inflated. Second pereopod with dactylus almost half length of propodus.

Description.—Size of the 71 specimens examined by us ranged from CL 3.8 to 9.4 mm and TL 12.0 to 33.1 mm; average CL 6.5 mm, average TL 21.4 mm. Of these 71 specimens, 17 were ovigerous females (including the holotype), the smallest of which

was CL 6.4 mm and TL 20.2 mm, and the largest of which was the holotype.

Carapace (Fig. 1a, b, f) smooth to lightly punctate, with scattered short setae especially anteriorly along midline. Rostrum broadly tapering, exceeding eyestalks and slightly exceeding postorbital prominences. Suborbital prominence (antennal spine) acute, tapering, sometimes conical toward tip, clearly exceeding anteriormost extension of ventrolateral border of carapace.

Eyes lacking pigment, eyestalks flattened-cylindrical, cuticular covering thin and soft, extending posteriorly and slightly laterally beneath carapace, joined medially, with slight indentation where 2 stalks meet.

Stylocerite of antennule (Fig. 1c) acute, extending anteriorly to approximately distal tip of first peduncle article. Antennal scale (scaphocerite) (Fig. 1e) oval, almost exactly twice as long as wide, with slight longitudinal dorsal ridge and with acute tooth at approximately $\frac{4}{5}$ length along lateral border.

Mandible (Fig. 2a, b) with 6 small teeth along cutting border and blunt posterior tooth separated from cutting teeth. Palp 2-segmented. Maxillae (Fig. 2c–f) as illustrated; first maxilla with row of even sized teeth along inner face of distalmost endite; second maxilla with 3 endites. Maxillipeds (Fig. 2g–n) similar to what has been described for other species in the genus (*C. vandoverae*, Martin & Hessler 1990; *C. chacei*, Williams & Rona 1986). Third maxilliped composed of 3 long segments (and 2 shorter ones, not illustrated), the first of which is thin and strap-like, the distalmost of which has a terminal constriction possibly indicative of former segment line (Martin & Hessler 1990).

First pereopods (primary chelipeds) (Fig. 3a–d) short, stout. Propodus inflated and thicker than dactylus. Dactylus and propodus each with row of small, corneous denticles along cutting border, and with row of longer setae along the distal outer face,

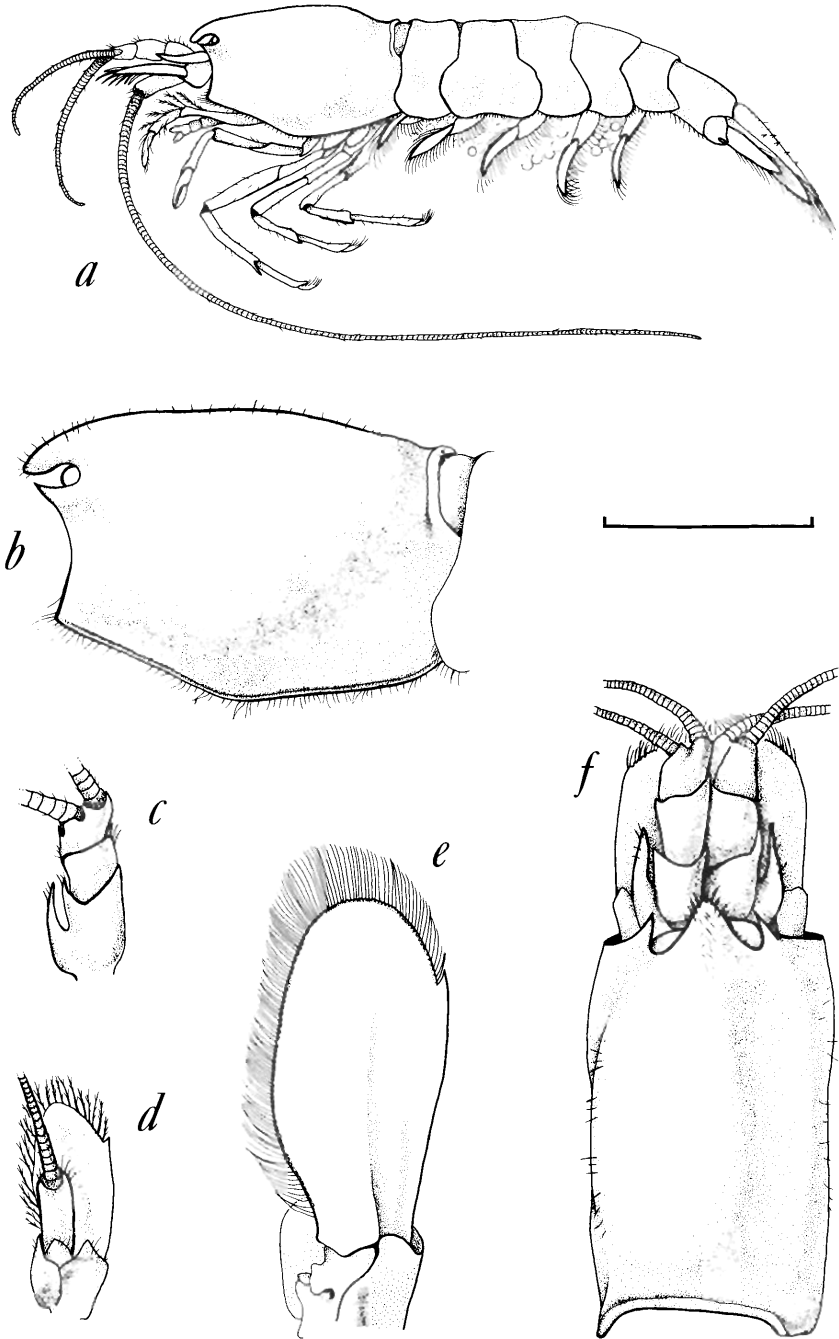


Fig. 1. *Chorocaris fortunata*, female holotype. a, lateral view, major cheliped missing (regenerating, visible as small bud posterior to third maxilliped); b, carapace and extremity of eyestalk; c, base of first antenna, ventral view; d, base of second antenna and antennal scale (scaphocerite), ventral view; e, dorsal view of scaphocerite; f, dorsal view of carapace, eyes, and bases of antennae. Scale bar = 10 mm (a), 5 mm (b-d, f), and 2.4 mm (e).

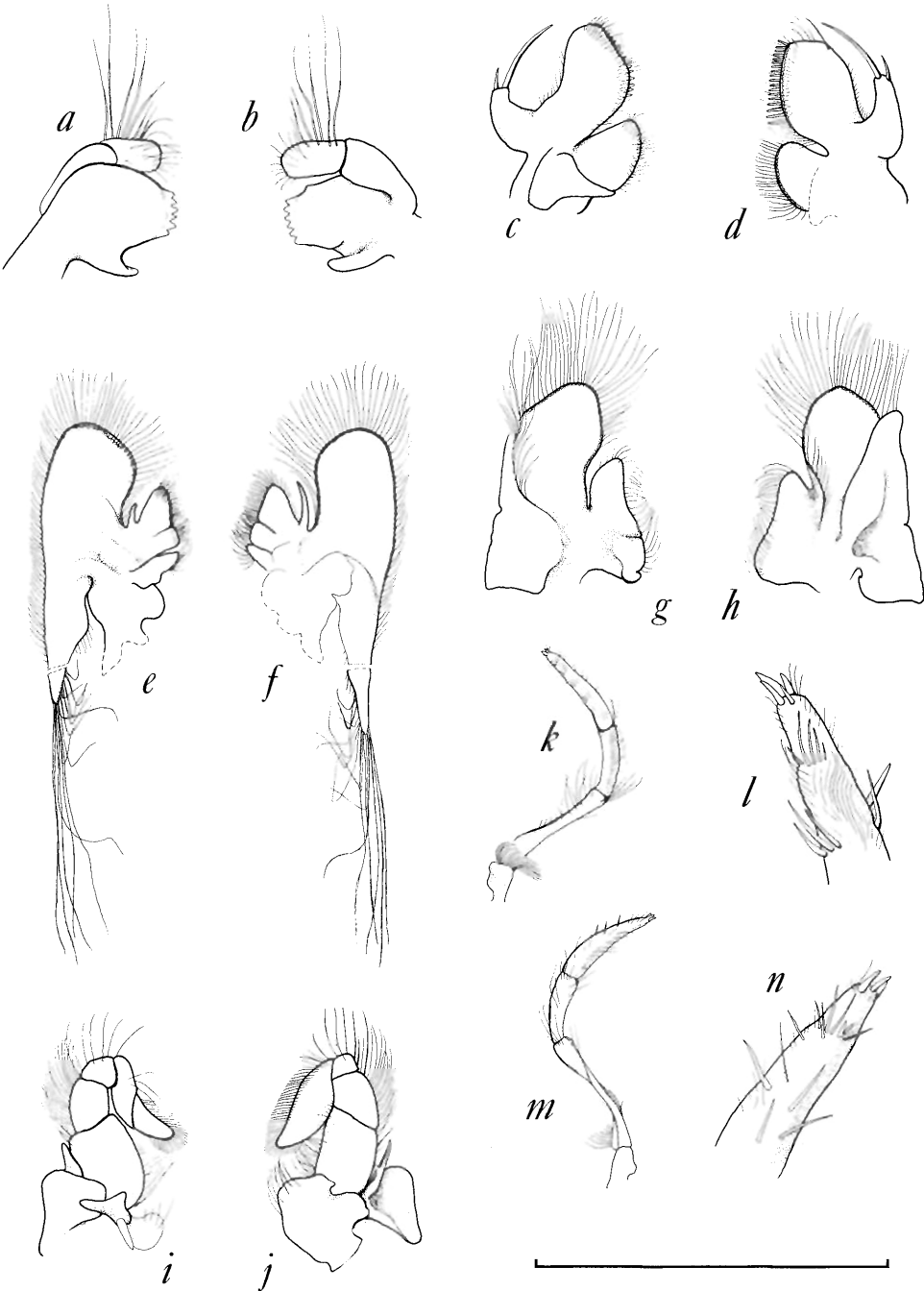


Fig. 2. *Chorocaris fortunata*, female holotype, mouthparts. a, b, right mandible in outer (a) and inner (b) view; c, d, right first maxilla in outer (c) and inner (d) view; e, f, right second maxilla in outer (e) and inner (f) view; lower part of figures e and f (area with long setae, below dotted line on basal region of exopod) taken from female paratype of similar size to holotype (CL 8.7 mm) (missing on right maxilla of holotype); g, h, right third maxilliped in outer (g) and inner (h) view; i, j, right second maxilliped in outer (i) and inner (j) view; k, l, m, and n, third maxilliped, outer view with higher magnification of tip (k, l) and inner views of same (m, n). Scale bar = 2.5 mm (a-d, l, n); 5.0 mm (e-j), and 10.4 mm (k, m).

somewhat obscuring comb row described above. Propodus rather deeply indented on outer face at 2 points (Fig. 3d). Carpus with strong dorsodistal tooth and with weak carpal brush (not illustrated). Second pereopod (Fig. 3e, f) chelate, chela more delicate than that of first pereopod, with propodus approximately 3.7 times longer than wide, and 1.8 times longer than dactylus; propodus and dactylus together appearing as an elongate oval. Ambulatory pereopods similar to one another, with short dactylus bearing 4–5 heavy, corneous-tipped spines (Fig. 3g–j).

Exopods lacking on all pereopods.

Pleurobranchs on pereopods 1–5; arthrobranchs on pereopods 1–4 and maxilliped 3.

Abdomen (Fig. 1a, 3k) with posterolateral angles of somites rounded, becoming broadly tapered on somite 5. Ventral border of somite 2 slightly indented. Telson (Fig. 3k) with 7–9 spines extending along lateral border and onto dorsum. Outermost uropod with single acute movable spine at outer end of suture line.

Coloration.—Preserved specimens ranged from almost pure white to a more commonly seen yellowish or rust color, caused apparently by the accumulation of bottom deposit material (oxydized sulfide according to M. Segonzac, pers. comm.) adhering to the plumose setae covering most of the appendages.

Natural history.—One specimen from the Lucky Strike vent field, given to Dr. Lipke Holthuis by Dr. W. Vervoort and not seen by us, was found “in the stomach of a hydroid polyp.” Although apparently in rather poor condition, it could be readily identified as *C. fortunata* (Lipke Holthuis, pers. comm.). Thus, at least sometimes *C. fortunata* serves as food for this as yet undescribed hydroid.

Etymology.—The name is from the Latin for luck or chance, referring to the collection site (Lucky Strike hydrothermal vent field) along the Mid-Atlantic Ridge.

Discussion

The smallest ovigerous female of *C. fortunata* examined by us (TL 20.2 mm) is smaller even than the juveniles of *C. chacei* listed by Williams & Rona (1986:460, table 2). Segonzac et al. (1993:541, table 2) also gave a relatively large size for *C. chacei*; they listed a size (TL) range of 47.3 to 66.2 mm for males, and 42.3 to 57.4 mm for females. For the Pacific *C. vandoverae*, Martin & Hessler (1990:2) gave a size range of TL 16.3 to 52 mm. The largest known specimen of *C. fortunata* measures TL 33.1 mm. Thus, *C. fortunata* is a considerably smaller species than either of its two congeners.

Additionally, *C. fortunata* is rather easily distinguished from *C. chacei* (the only other described Atlantic species) by several morphological features, notably its acute antennal spine, more narrow rostrum, less produced ventrolateral carapace border, longer dactylus on pereopod 2, and longer and narrower scaphognathite. These differences are such that even on a schematic diagram (e.g., Segonzac et al. 1993:fig. 2C) they are readily apparent; especially clear are the differences in the relative lengths of the second pereopod dactylus/propodus and the forward extension of the anterolateral carapace border in that figure.

Size is also one of the reasons that we have attributed the 2 Broken Spur specimens (from a collection of 10 individuals that ranged from TL 18 to 27 mm) to *C. fortunata*, despite the fact that they are slightly more delicate in overall appearance and are pale in comparison to the darker coloration of the Lucky Strike samples (after fixation; we have not seen any live specimens). Apparently 3 or 4 different types of shrimp were observed at the Broken Spur site, all in close proximity to vent openings or in shimmering water from crevices with diffuse flow, although only 14 total specimens were collected (E. Southward, pers. comm.).

The new species occurs with at least one

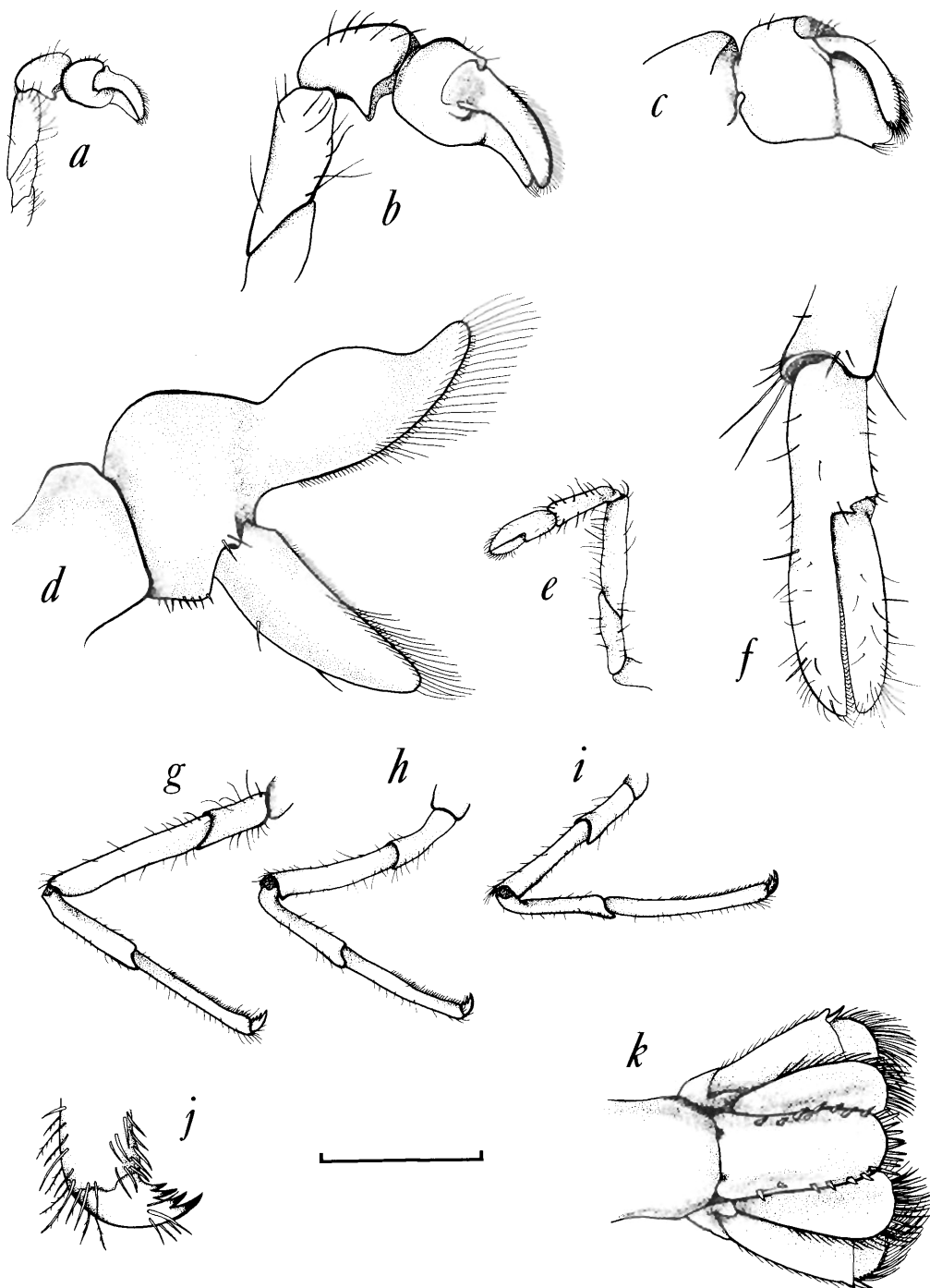


Fig. 3. *Chorocaris fortunata*, female holotype (except a-c), pereiopods and telson. a, right chela of female paratype of similar size as holotype (CL 8.7 mm) (right cheliped regenerating in holotype); b, higher magnification of same chela seen in a; c, inner surface of same chela shown in a and b; d, left chela, turned to expose indentations on outer face of propodus; e, second pereiopod; f, chela of second pereiopod (note relative lengths of dactylus and propodus); g-i, pereiopods 3-5; j, dactylus of pereiopod 3 (from figure g); k, dorsal view of telson and uropods. Scale bar = 4.2 mm (a, e, g-i, k); 2.0 mm (b, c); and 1.0 mm (d, f, j).

previously described species at the Lucky Strike vent. Among the samples sent to us that included *C. fortunata* was at least one larger specimen that was easily identified as *Chorocaris chacei*; additional specimens of *C. chacei* were collected from this site by C. L. Van Dover (pers. comm.).

The genus *Chorocaris* was originally considered a member of the family Bresiliidae, although problems with bresiliid taxonomy in general—noted by many previous workers on this family—were mentioned by Martin & Hessler (1990:9). Subsequent to that paper, Christoffersen (1991) placed the genera *Alvinocaris* and *Rimicaris* in the relatively recently erected family Alvinocarididae (Christoffersen 1986), but whether he intended for both *R. exoculata* and *R. chacei* (now *Chorocaris chacei*) to be included in this family was not made clear. Thus, *Chorocaris* was not mentioned in the original erection of the family Alvinocarididae. Christoffersen's family Alvinocarididae was recognized by Segonzac et al. (1993) in their study of trophic behavior of the three caridean genera known from vents, and a brief diagnosis of the family was given in a footnote (Segonzac et al. 1993:536). Segonzac et al. (1993) clearly stated that both *Chorocaris* and *Rimicaris*, as well as *Alvinocaris* Williams & Chace, 1982, belong to the family Alvinocarididae. Unfortunately, the two characters given in that brief diagnosis are, we feel, an insufficient basis for erecting a new caridean family. M. de Saint Laurent (author of the footnote in Segonzac et al. 1993) listed the following as characters shared by the Alvinocarididae genera: (1) lack of exopods on thoracic appendages posterior to the maxillipeds, and (2) eyestalks reduced and attached to each other and to neighboring parts. The new species exhibits these features as well. However, loss of pereopodal exopods has occurred often among the Caridea, and reduction or modification of the eyestalks in a rather common theme among deep-sea crustaceans. Other shared features of the three "alvinocaridid" genera

are given later in that paper (Segonzac et al. 1993:541), but these are somewhat vague: "similarities in the posterior region of the thorax, in the abdomen, and in the telson, and also in the structure of most cephalothoracic appendages" (from the 1994 English translation). Therefore, although the Alvinocarididae may someday prove to be a natural assemblage, we do not feel that sufficient characters have yet been established to recognize this taxon.

Holthuis (1993), in his compilation of the Recent genera of caridean and stenopodidean shrimps (which was published prior to the Segonzac et al. 1993 paper), followed Chace (1992) in recognizing only the Bresiliidae, treating Christoffersen's family Alvinocarididae as a synonym (Holthuis, 1993: 69). We have followed this more conservative approach here, i.e., treating *Chorocaris* as a member of the Bresiliidae while recognizing that the Bresiliidae is most likely an artificial assemblage.

The fact that *Chorocaris* is found in widely separated areas of the world ocean—the Mariana Back-Arc Basin and the Mid-Atlantic Ridge—raises biogeographically interesting questions. The new species is no more different from the western Pacific *C. vandoverae* than it is from the geographically closer *C. chacei*. Possible routes of dispersal that might account for distribution of species of *Chorocaris* are discussed further in Martin & Hessler (1990).

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