

## Hermit crab species of the genus *Clibanarius* (Crustacea: Decapoda: Diogenidae) from mangrove habitats in Papua, Indonesia, with description of a new species

DWI LISTYO RAHAYU

Research Center for Oceanography, Indonesian Institute of Sciences (LIPI), Jl. Pasir Putih 1, Ancol Timur, P.O. Box 4801/JKTF, Jakarta 11048, Indonesia (dwilistyo@email.com)

### Abstract

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A new species of hermit crab, *Clibanarius harisi*, is described from mangrove and estuarine areas in the south coast of Papua, Indonesia. The new species is separated from its congeners by the presence of a strong spine on the ventromesial margin of the merus, and the absence of longitudinal stripes on the second and third pereopods. *Clibanarius ambonensis* Rahayu and Forest, 1992 and *C. antennatus* Rahayu and Forest, 1992, are reported for the second time, and a new colour variation of *C. longitarsus* (De Haan, 1849) is documented.

### Keywords

Crustacea, Anomura, Diogenidae, *Clibanarius*, new species

### Introduction

Among the decapod crustaceans collected during the Biological Monitoring Program of the Environmental Department of Perseroan Terbatas Freeport Indonesia (PT. Freeport Indonesia) in the south coast of Papua, Indonesia (04°40'–05°05'S, 136°35'–137°20'E), four species of hermit crabs belonging to the genus *Clibanarius* were found in mangrove and estuarine areas.

Species of *Clibanarius* from Indonesia are well studied (Buitendijk, 1937; Haig and Ball, 1988; Rahayu and Forest, 1992; Rahayu, 1999), nevertheless a new species has been discovered. The present paper describes *Clibanarius harisi* sp. nov., live coloration of *C. ambonensis* Rahayu and Forest, 1992, and *C. antennatus* Rahayu and Forest, 1992, and records a new colour variation in *C. longitarsus* De Haan, 1849.

The material is deposited in the Zoological Museum, Bogor (MZB), and Research Center for Oceanography, Jakarta, of the Indonesian Institute of Sciences, Indonesia (RCO); Marine and Coastal Laboratory of Environmental Department of PT. Freeport Indonesia in Timika, Papua, Indonesia (PTFI); Zoological Reference Collection of the Raffles Museum, National University of Singapore (ZRC); and Muséum national d'Histoire naturelle, Paris, France (MNHN). Specimen measurements (mm) refer to shield length, measured from the tip of rostrum to the posterior border of shield. Colour descriptions are of live material.

### *Clibanarius ambonensis* Rahayu and Forest

*Clibanarius ambonensis* Rahayu and Forest, 1992: 753, figs 2b, 3c, d.

*Material examined.* Pulau Kamora, sandy mud, 20 Jun 2000, 3 females (2 ovigerous), 2.3–2.7 mm (RCO 0102), and 23 Jun 2000, 1 male, 1.9 mm, J. Volosin (PTFI).

*Diagnosis.* Shield almost as long as broad. Ocular peduncles little shorter than shield, diameter 0.2 of peduncles; ocular acicles with 4 or 5 denticles. Antennular peduncles reaching slightly beyond base of cornea. Antennal peduncles not reaching completely base of cornea; antennal acicles not exceeding proximal margin of last peduncular segment. Chelipeds nearly equal; dorsolateral faces of propodi covered with dense small conical tubercles, dorsal margins of carpi each with single distal acute spine. Dactyls of second and third pereopods about the same length as propodi, 9 small spines on ventral margin.

*Colour in life.* Shield whitish with brown spots. Ocular peduncles bluish-white, dorsal surface with narrow dark brown longitudinal stripe; proximal part brown. Ocular acicles brown with bluish-white spines. Antennal peduncles bluish-white with dark brown longitudinal stripe on dorsal surface of fifth segment. Chelipeds brown with light blue spines; dactyls bluish-white with 2 longitudinal brown stripes on dorsal surfaces. Second and third pereopods bluish-white with brown longitudinal stripes on lateral surfaces: dactyls and meri with 3

longitudinal stripes, propodi with 4 longitudinal stripes, carpi with 2 longitudinal stripes.

*Distribution.* Ambon and Halmahera islands, Maluku, Indonesia, now extended eastward to the south coast of Papua.

*Remarks.* The present specimens agree well with the original description of the species by Rahayu and Forest (1992), except for one minor difference. The dactyls of the second and third pereopods of Papua specimens are slightly shorter than the propodi, while Rahayu and Forest (1992) described them as approximately the same length. *Clibanarius ambonensis* is recognisable by the number of longitudinal stripes on the ocular peduncles and second and third pereopods as described above.

*Clibanarius ambonensis* resembles *C. striolatus* Dana, 1852. The shield of the two species is almost as long as broad; the ocular peduncles are stout, longer than the antennal and antennular peduncles; the dactyls of the second and third pereopods are approximately the same length as propodi. Live specimens can be distinguished by their coloration. The general colour of *C. striolatus* is yellowish green or brownish green with large brown longitudinal stripes on the second and third pereopods, while *C. ambonensis* is brownish blue or whitish blue with narrower brown longitudinal stripes on the pereopods. In addition, *C. ambonensis* possesses a longitudinal stripe on the dorsal surface of the ocular peduncles, which is absent in *C. striolatus*.

***Clibanarius antennatus* Rahayu and Forest**

*Clibanarius antennatus* Rahayu and Forest, 1992: 755, figs 2c, 3e, f.

*Material examined.* Sungai Kamora, sandy mud, 8 Jun 2000, 10 males, 3.0–3.8 mm, 8 females (6 ovigerous), 2.8–3.5 mm (PTFI), and 11 Jul 2001, 2 males, 3.3, 3.6 mm, 10 females (5 ovigerous), 2.7–3.42 mm, D.L. Rahayu (RCO 0103).

*Diagnosis.* Shield longer than broad. Ocular peduncles stout, shorter than shield, cornea inflated, diameter 0.3 of peduncles; ocular acicles with 1 or 2 denticles. Antennal and antennular peduncles reaching middle of cornea; antennal acicles short, reaching slightly beyond middle of fourth peduncular segment. Chelipeds subequal, right cheliped longer and broader than left; dorsolateral faces of propodi covered with dark tipped conical tubercles, dorsal margins of carpi each with 3 acute spines. Dactyls of second and third pereopods notably arched, 1.5 to 1.8 longer than propodi.

*Colour in life.* Shield mottled light blue or bluish-white and dark brown. Ocular peduncles bluish-white, dorsal surface with 1 thin, brown coloured, interrupted longitudinal stripe. Antennular peduncles transparent bluish-white. Antennal peduncles brown with white longitudinal stripe on dorsal surface of fourth and fifth segments; first and second segments dark brown; antennal acicles dark brown with white spines. Chelipeds brown with blue spines; tips of fingers light brown or whitish-orange. Second and third pereopods bluish-white or light blue with brown longitudinal stripes over entire length; meri with 2 stripes; carpi with 3 stripes; propodi with 4 stripes: 1 very narrow stripe on dorsal margin, 1 broader and 1

narrower median stripe with distal and proximal parts broadened and 1 narrow, interrupted stripe on ventral margin; dactyls with 2 interrupted stripes.

*Distribution.* Barombong, South Sulawesi, Indonesia (type locality), now extended eastwards to south coast of Papua.

*Remarks.* Morphological characters and colour pattern of Papua specimens agree well with Rahayu and Forest's (1992) description of *Clibanarius antennatus* except for the number of longitudinal stripes on the carpi and propodi of the second and third pereopods. Their colour description was based on material preserved in alcohol, possibly faded, leaving only two stripes on the carpi of the pereopods (there are three stripes in the live animal), and no interrupted stripe on the ventral margins of the propodi (there is an interrupted stripe in the live animal).

***Clibanarius longitarsus* (De Haan)**

*Pagurus longitarsus* De Haan, 1849: 211, fig. 3.

*Clibanarius longitarsus.*—Fize and Serène, 1955: 83, fig. 11, pl.3, figs 1, 7, 10, 13.—Lee, 1969: 44.—Dechancé, 1964: 31, fig. 4.—Lewinsohn, 1969: 18.—Lewinsohn, 1982: 38.—Khan and Natarajan, 1984: 8, fig. 6.—Morgan, 1987: 172.—Haig and Ball, 1988: 163.—Rahayu and Forest, 1992: 762, figs 4b, 5b, 6b.

*Material examined.* Sungai Jaramaya, mud, 12 Nov 1999, 4 males, 2.8, 7.4, 8.1, 9.3 mm; 2 females, 3.0, 5.4 mm, and 8 Dec 1999, 4 females, 3.5, 3.9, 4.1, 6.5 mm, D.L. Rahayu (PTFI); Ajkwa, mud, 20 Jan 2000, 1 female, 5.8 mm; 21 Jun 2000, 1 male, 8.5 mm, 2 females (1 ovigerous), 5.0, 6.9 mm, D.L. Rahayu (MNHN); Kamora, sandy mud, 4 Apr 2000, 2 females 7.3 mm, and 8 Jun 2000, 1 female, 4.2 mm, D.L. Rahayu (PTFI); Pulau Bidadari, sandy mud, 21 Jun 2000, 7 males, 2.8, 4.9, 5.0, 5.2, 5.6, 7.4, 9.0 mm; 6 females, 3.3, 4.2, 4.3, 4.4, 4.6, 4.7 mm, D.L. Rahayu (RCO 0104).

*Diagnosis.* Shield longer than broad. Ocular peduncles approximately 0.8 length of shield; ocular acicles terminating in simple or bifid spine. Antennular peduncles as long as or slightly longer than ocular peduncles. Antennal peduncles barely reaching base of cornea; antennal acicles not reaching distal margin of fourth peduncular segment. Chelipeds subequal, right slightly longer and more robust than left; dorsomesial margins of carpi each with 1 corneous-tipped spines distally; dorsal surfaces of palms and dactyls with irregular rows of sometimes corneous-tipped spines. Dactyls of second and third pereopods about 1.5 length of propodi, ventral margin with row of corneous spinules.

*Colour in life.* Shield mottled brown and blue or light brown with several blue patches. Rostrum, lateral projections and anterior margin between rostrum and lateral projections, white. Ocular peduncles brownish-orange, transparent, dorsoproximal surface with dark brown marking; corneas black; ocular acicles brown with white spines. Antennular peduncles brown, dorsal surface with longitudinal bluish-white stripe. Antennal peduncles brown; fourth and fifth segments brown, dorsal surface with bluish-white longitudinal stripe. First, second and third segments brown; antennal acicles brown with white spines.

Chelipeds brown with blue or blue-green tubercles and spines; spines with black corneous tips. Pereopods brown with blue and orange stripes over entire length. Lateral surfaces of

meri each with oblique orange stripe; carpi with 1 orange and 1 blue longitudinal stripe on lateral faces. Propodi with 3 longitudinal stripes: 1 orange stripe bordered by fine red lines on dorsal margin; next, blue metallic median stripe bordered by dark brown lines; and 1 orange stripe next to ventral margin. Dorsal margin of dactyls each with longitudinal orange stripe, lateral face with longitudinal blue stripes bordered by dark brown lines; ventral margin whitish-orange. Mesial surfaces of carpi and meri brown with blue marking; mesial surfaces of dactyls and propodi same as lateral surfaces.

*Distribution.* Indo-West Pacific, from Red Sea and Indian Ocean, Malay Archipelago to Japan and Australia.

*Remarks.* The very common and widespread intertidal hermit crab, *C. longitarsus*, is very variable in coloration (Fize and Serène, 1955; Ball and Haig, 1972; Morgan, 1987). The Papua specimens agree well with Fize and Serène's (1955) description and illustration, and Rahayu and Forest's (1992) illustration. Some specimens have the same coloration as described by Morgan (1987) from Darwin and Port Essington, Australia. However, most of the specimens reported herein have the coloration as described above. The blue median longitudinal stripe on the lateral face of each pereopod, a specific character of this species, is more intense in the specimens collected in dense mangrove habitats. The orange stripes on the pereopods and proximal brown fleck or spot on the dorsal surface of each ocular peduncle, have never been recorded previously.

*Clibanarius harisi* sp. nov.

Figure 1

*Material examined.* Holotype. Stn EM 334, 4°49.39'S, 136°38.10'E, 2.7–6.9 m, otter trawl, 14 Feb 2000, 1 female, 6.8 mm, A. Haris (MZB Cru 1500).

Paratypes. Stn EM 279, 04°48.15'S, 136°50.59'E, 4.5–5.7 m, otter trawl, 7 and 14 Feb 2000, 2 males, 10.1 and 6.5 mm, 1 female, 8.2 mm, A. Haris (ZRC 2002.0271); collected with holotype, 1 male 11.1 mm (MZB Cru 1501); Pulau Kamora, intertidal, 8 Jun and 16 Oct 2000, 2 males, 2.5 and 3.2 mm, 3 females, 2.4, 4.0 and 4.1 mm, D.L. Rahayu (RCO Ca 0101).

Other material. Stn EM 275, 04°52.67'S, 136°47.22'E, 5.4–7.2 m, otter trawl, 17 Dec 1997, 1 male 5.1 mm, K. Hortle (PTFI); Poriri, intertidal, 15 Feb and 4 Aug 1999, 1 male, 6.1 mm 1 female, 11.1 mm, A. Haris (MNHN); stn EM 430, 04°56.48'S, 137°3.19'E, 3–4 m, trawl, 16 Feb and 17 Mar 2000, 1 male, 5.1 mm, 1 female, 2.7 mm, A. Haris (RCO 0105); stn EM 332, 04°48.61'S, 136°39.14'E, 1.8–5.4 m, otter trawl, 14 Feb 2000, 1 female, 6.2 mm, A. Haris (PTFI); stn EM 772, 04°56.84'S, 137°7.39'E, 6 m, otter trawl, 19 Mar 2000, 1 male, 6.6 mm, A. Haris (PTFI).

*Description.* Shield slightly longer than broad; dorsal surface with scattered tubercles and sparse tufts of setae, lateral margins rounded and armed with 2 or 3 teeth. Rostrum triangular, acute, longer than lateral projections, exceeding bases of ocular acicles. Lateral projections broadly triangular terminating in 1 or 2 small teeth.

Ocular peduncles slender, inflated basally, about 0.8 length of shield, reaching distal 0.8 of antennular peduncles. Corneas weakly dilated, diameter approximately 0.16 length of

peduncles. Ocular acicles small, triangular, with 4 or 5 marginal spines.

Antennular peduncles slender; ultimate, penultimate and basal segments unarmed.

Antennal peduncles reaching distal 0.8 of ocular peduncles. First segment short with small spinule on distolateral margin; second segment with dorsolateral distal angle produced, terminating in small spine; 1 spinule on distomesial margin; third segment with ventrodorsal spine; fourth segment with small dorsodorsal spine; fifth segment unarmed. All segments with scattered setae. Antennal acicles exceeding base of fifth peduncular segment, terminating in acute spine; mesial margin with 5 corneous spines.

Chelipeds subequal, right slightly larger than left, armament similar, scarcely setose. Merus with row of crenulations along dorsal margin; ventrolateral margin with large and pointed tubercles, 2 strong spines distally; ventromesial margin with row of tubercles, 1 strong pointed tooth proximally. Carpus half length of merus, dorsomesial margin with 3 strong spines and 2 weak tubercles; dorsal surface with scattered large and small tubercles; mesial and ventral faces nearly smooth. Palm as long as or slightly longer than carpus, dorsomesial margin with longitudinal row of spines; dorsal surface with irregular, widely-spaced longitudinal rows of spines, dorsolateral face with irregular rows of pointed tubercles, continuing onto fixed finger; mesial face with blunt tubercles. Fixed finger slightly broader than dactyl; cutting edge with large median tooth followed by smaller teeth, terminating in large corneous claw; dorsal surface covered with conical tubercles. Dactyl slender, as long as or slightly shorter than palm; cutting edge with large median tooth followed by smaller teeth, terminating in large corneous claw; dorsal surface with row of pointed tubercles, decreasing in size distally; dorsomesial margin with row of pointed tubercles; mesial face with row of tubercles.

Second and third pereopods sparsely setose, moderately long, generally similar from left to right. Second pereopods with meri almost 1.5 times length of carpi; dorsal margins unarmed, ventral margins each with 1 strong distal spine and row of spinules proximally. Carpi 0.7 length of meri, dorsodorsal margins each with 1 strong, corneous-tipped spine and 1 weaker spine. Propodi slender, 1.4 length of carpi, 3.6 longer than wide, unarmed, lateral faces slightly flattened. Dactyls slightly curved, 1.3 length of propodi, terminating in small corneous claws; dorsal margins each with shallow longitudinal groove and dense and stiff tufts of setae; lateral faces each with 3 shallow longitudinal grooves: first groove 0.75 length of dactyl; second groove wider, 0.5 length of dactyl; third groove longer and very narrow; mesial faces each with 1 longitudinal groove; ventral margins each with row of spinules in distal half. Third pereopods stouter than the second; meri each with distal spine on ventral margin; carpi 1.8 length of meri, dorsodorsal margins each with strong, corneous-tipped spine; propodi stout, 1.2 length of carpi, 2.7 longer than wide, unarmed, lateral faces slightly flattened; dactyls 1.5 longer than propodi; grooves on dorsal margins and lateral faces, and row of spinules on ventral margins similar to second pereopods.

Telson with asymmetrical posterior lobes, left longer than

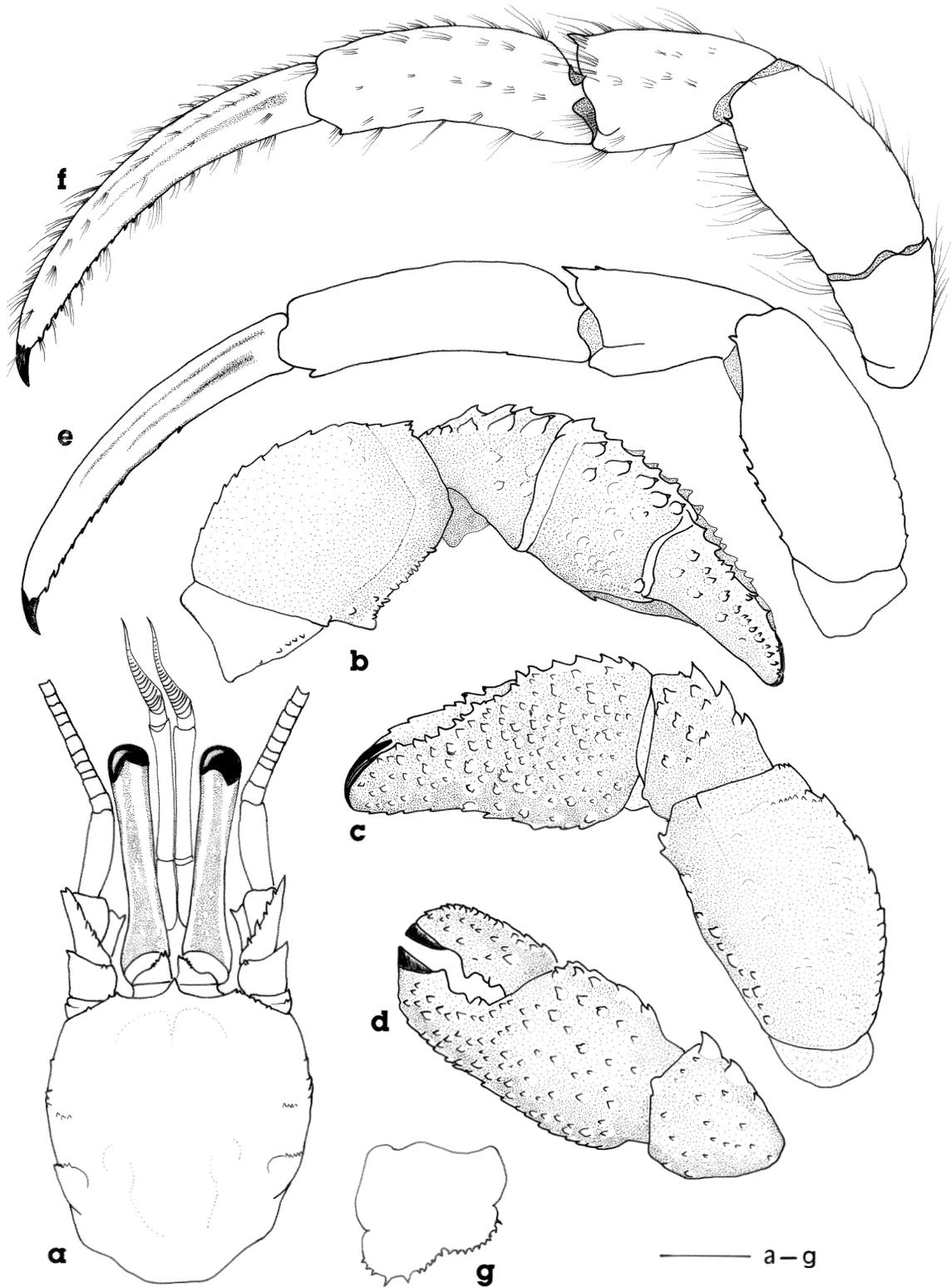


Figure 1. *Clibanarius harisi* sp. nov. Holotype, female, 6.8 mm (ZRC Cru 1500). a, shield and cephalic appendages, dorsal view; b, left cheliped, dorsomesial view; c, left cheliped, lateral view; d, left chela, dorsal view; e, second left pereopod, lateral view; f, third left pereopod, lateral view; g, telson, dorsal view. Scale = 2 mm. Setae omitted except on third left pereopod.

right, separated by shallow median cleft; terminal margins each with strong spines, smaller spines on right margin.

**Colour in life.** Shield yellowish-white with 2 brown spots on dorsal surface. Ocular peduncles light olive-green with 3 longitudinal brown stripes: 1 broad stripe on dorsal surface, tapering distally, broadened proximally; lateral and mesial faces each with 1 narrow stripe. Penultimate segments of antennular peduncles bluish-brown, ultimate segments brown. Antennal peduncles and antennal acicles brown. Chelipeds generally greenish-brown; meri, carpi and palms greenish-brown with blue spines; fixed fingers and dactyls light brown or red-brown with bluish-white spines, claws black. Meri and carpi of second and third pereopods dark greenish-brown; propodi and dactyls greenish-brown. In smaller specimens, dactyls and propodi greenish-orange.

In alcohol, chelipeds, pereopods and ocular peduncles red-orange. Longitudinal stripes on ocular peduncles dark red.

**Etymology.** This species is dedicated to Mr Abdul Haris who collected most specimens of this species.

**Distribution.** South coast of Papua, Indonesia; 0–7.2 m depth.

**Remarks.** Most species of *Clibanarius* that possess longitudinal stripes on the dorsal surfaces of the ocular peduncles also have longitudinal stripes on the second and third pereopods, such as *Clibanarius ambonensis*, *C. antennatus*, *C. bistratus* Rahayu and Forest, 1992, *C. clibanarius* (Herbst, 1791), *C. eurysternus* (Hilgendorf, 1878), *C. fonticola* McLaughlin and Murray, 1990, *C. infraspinus* (Hilgendorf, 1869), *C. padavensis* De Man, 1888, *C. rhabdodactylus* Forest, 1953, *C. signatus* Heller, 1861, *C. taeniatus* (Milne Edwards, 1848), and *C. zebra* Dana, 1852. However, *C. harisi* possesses longitudinal stripes on the dorsal surface of the ocular peduncles, and lacks longitudinal stripes on the pereopods. The most similar species to *C. harisi* is *C. infraspinus*. Both species possess a strong spine on the ventromesial margins of the meri of the chelipeds, and longitudinal stripes on the dorsal surfaces of the ocular peduncles. *Clibanarius harisi* differs from *C. infraspinus* by the presence of longitudinal sulci on the lateral faces of the dactyls of the second and third pereopods, the absence of row of spines on the dorsal margin of the carpus of each second pereopod and the absence of longitudinal stripes on the lateral faces of the second and third pereopods. In addition, the shield of *C. infraspinus* is more elongate and the spines on the propodi of the chelipeds are stronger than in *C. harisi*.

The coloration preserved in alcohol is uniform red, similar to *C. clibanarius* described by De Man (1888: 237) based on specimens in the Berlin Zoological Museum. The photograph of the type specimen of *C. clibanarius* from the Berlin Zoological Museum given by Sakai (1999) has no visible longitudinal stripes on the pereopods. However, McLaughlin (pers. comm.) examined the type specimen and confirmed the presence of faint longitudinal lines on the ocular peduncles and pereopods as mentioned by Alcock (1905). The presence of faint longitudinal stripes on the pereopods, and the absence of a strong spine on the ventromesial margin of the meri of the chelipeds distinguish *C. clibanarius* from *C. harisi*.

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