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Research Article

First record of machine gun coral shrimp, *Coralliocaris graminea* (Dana, 1852) (Caridea: Palaemonidae) from Lakshadweep archipelago, Arabian Sea with a key to the genus *Coralliocaris* Stimpson, 1860

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Machine gun coral shrimp, *Coralliocaris graminea*, is reported for the first time from Lakshadweep, India, based on two specimens collected during low tide at a depth of 2 feet from Agatti Island. Globally, *C. graminea* was reported from the Eastern and Southern Indian Ocean, Gulf of Aden, Pacific Ocean and the Persian Gulf. However, the occurrence of *C. graminea* has not been reported from the Arabian Sea. In this context, the present study provides a new distributional record of *C. graminea* from the Lakshadweep Islands, India. Detailed information about the taxonomic identification of the species, taxonomic remarks, and previous distribution is discussed.

[**Keywords**: Agatti Island, Arabian Sea, Coral shrimp, India, New distributional record]

Introduction

Decapod crustaceans belong to the family Palaemonidae Rafinesque, 1815, consists of 156 genera and 1107 valid species, distributed globally[1]. Generally, palaemonid shrimps are attractive due to their bright colouration, but shrimps of the genus *Coralliocaris* Stimpson[2] within the sub-family Pontoniinae Kingsley, 1879 are particularly fascinating, due to their unique body designs and patterns. This genus can be differentiated from other pontoniid shrimp genera by their compressed bodies, rostrum with teeth on the dorsal and ventral margin, smooth carapace, presence of antennal spine, absence of the hepatic spine, first maxilliped consists of a strong exopod, second maxilliped without podobranch and third maxilliped possesses arthrobranch[3,4]. Globally, the genus *Coralliocaris* consists of 11 valid species[5] namely, *C. brevirostris* Borradaile[6]; *C. graminea* (Dana)[7]; *C. junckeri* Li and Poupin[8]; *C. labyrintha* Mitsuhashi and Takeda[9]; *C. macrophthalma* (H. Milne Edwards)[10]; *C. nudirostris* (Heller)[11]; *C. sandyi* Mitsuhashi and Takeda[9]; *C. superba* (Dana)[7]; *C. taiwanensis* Fujino and Miyake[12]; *C. tridens* Mitsuhashi, Fujino and Takeda[13] and *C. viridis* Bruce[14]. All the aforementioned species show scanty and discontinuous distribution across the Atlantic, Indian, and Pacific Oceans. In India, *C. graminea* has been reported from the Andaman & Nicobar Islands and the Gulf of Mannar[4,15]. The *C. graminea*, commonly known as machine gun coral shrimp, was collected during a recent exploration conducted at Agatti Island, Lakshadweep, Arabian Sea. The present study represents the first record of *C. graminea* from the Arabian Sea and provides detailed notes on its morphological aspects and distribution.

Materials and Methods

Study area

Two live shrimp specimens, one each male and female were collected from Agatti Island (10°50'44" N, 72°11'22" E), Lakshadweep, India (Fig. 1). The shrimps were captured in live condition near to the shore region of Agatti Island (Fig. 2) at a depth of 2 feet in low tide from the live coral, *Acropora* sp., using hand net and forceps during September 2024. The individuals were observed to be solitary within the coral habitat. The collected shrimps were transported to the Live Germplasm Resource Centre of the ICAR-National Bureau of Fish Genetic Resources (NBFGR), Agatti Island, for further examination. The specimens survived in live condition for a week, and after mortality, both specimens were preserved in 90 % alcohol for further

analysis. After morphological evaluation, the specimens were deposited in the National Fish Museum and Repository of the ICAR-NBFGR, Lucknow, India.

Morphological analyses

The images of the shrimp specimens were captured using a Nikon D-5300 camera. The shrimp was examined under the Magnus (MSZ-TR) and UniLab (Serial No. 30509) microscopes. Previously published literature by Bruce[16] and Jayachandran[4] was referred to confirm the taxonomical identification of the genus and species. Sketches of the specimens were drawn using the SketchBook software with a WACOM CTL-472/K0-C tablet, and then the drawn figures were assembled, using Adobe Photoshop CS6.

Results

Systematic position

Order: Decapoda Latreille, 1802
Infraorder: Caridea Dana, 1852
Superfamily: Palaemonoidea Rafinesque, 1815
Family: Palaemonidae Rafinesque, 1815
Genus: *Coralliocaris* Stimpson, 1860
Species: *Coralliocaris graminea* (Dana, 1852)
(Figs. 3 – 5)

Synonymy

Oedipus gramineus Dana[7]: 25.
Coralliocaris inaequalis Ortmann[17]: 510.
Coralliocaris graminea Stimpson[2]: 38; Miers[18]: 563; Borradaile[19]: 324, 383; Kemp[20]: 269, figs. 96–97; Balss[21]: 294; Kubo[22]: 70, figs. 33–35; Holthuis[23]: 17, 186–189, fig. 91; Johnson[24]: 60; Patton[25]: 277; Miyake & Fujino[26]: 423, 431, figs. 7 a-c; Taylor[27]: 186, 189; Bruce[28]: 400–408, 414; Bruce[16]: 132–135; figs. 25–28; Johnson[29]: 32; Chace & Bruce[3]: 77; Patton[30]: tab. 2; Jayachandran[4]: fig. 65; Anker & De Grave[31]: 410, fig. 79.

Materials examined

PALCGRA.1/NBFGR (1 male, CL: 5.4 mm), PALCGRA.2/NBFGR (1 female, CL: 4.9 mm), Agatti Island, Lakshadweep, India, 10°50'44" N, 72°11'22" E, 2 feet depth, coll. Mohammed Naeem and Rejani Chandran, 17 September 2024.

Diagnosis

Carapace smooth, antennal spine present, hepatic spine absent; rostrum short with 5 teeth on dorsal margin and 2 on ventral margin in both male and female. First maxilliped protopod not bifurcated, endopod tiny; second maxilliped curved; third maxilliped short, not exceeding 1st pereiopod distal region of merus. 1st pereiopod comparatively stout, reaching beyond the distal portion of antennular peduncle; finger sub-equal to palm, 0.5 times long as palm; carpus slightly longer than merus. 2nd pereiopod unequal, reaching far beyond 1st pereiopod; palm

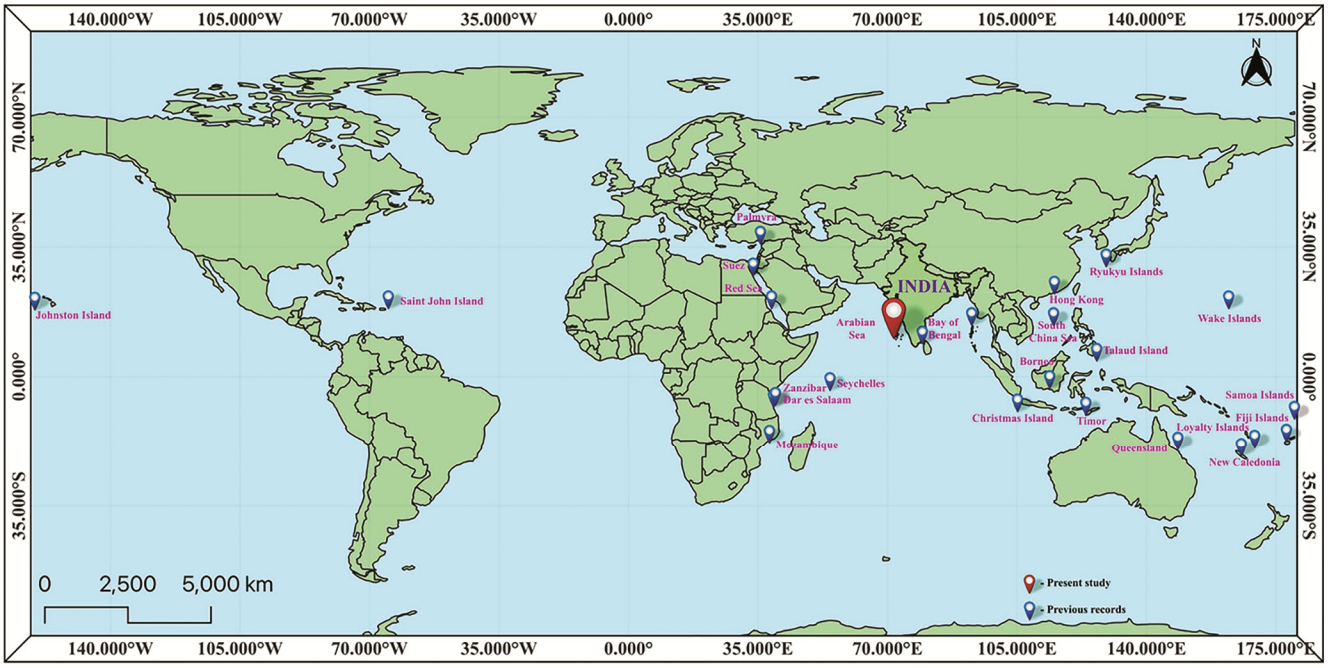

Fig. 1 — Map representation of the study area Agatti Island, Lakshadweep, India (Note: Blue drop markings denotes previous global records and red drop marking denotes the present study area)

sub-cylindrical in shape, 4.7 times long as carpus, 7.5 times long as ischium. Ambulatory pereiopods (3–5) consist of bunch of setae, spine absent. 3rd pereiopod reaching near to anterior portion of scaphocerite; dactylus 0.26 times long as propodus, 0.5 times long as carpus, 0.2 times long as merus; propodus 1.9 times long as carpus, 0.8 times long as merus, 2.5 times long as ischium; carpus 1.9 times long as dactylus. 4th pereiopod reaching middle portion of scaphocerite. 5th pereiopod smaller than other ambulatory pereiopods, propodus 1.3 times long as ischium; merus 6.6 times long as dactylus. Telson

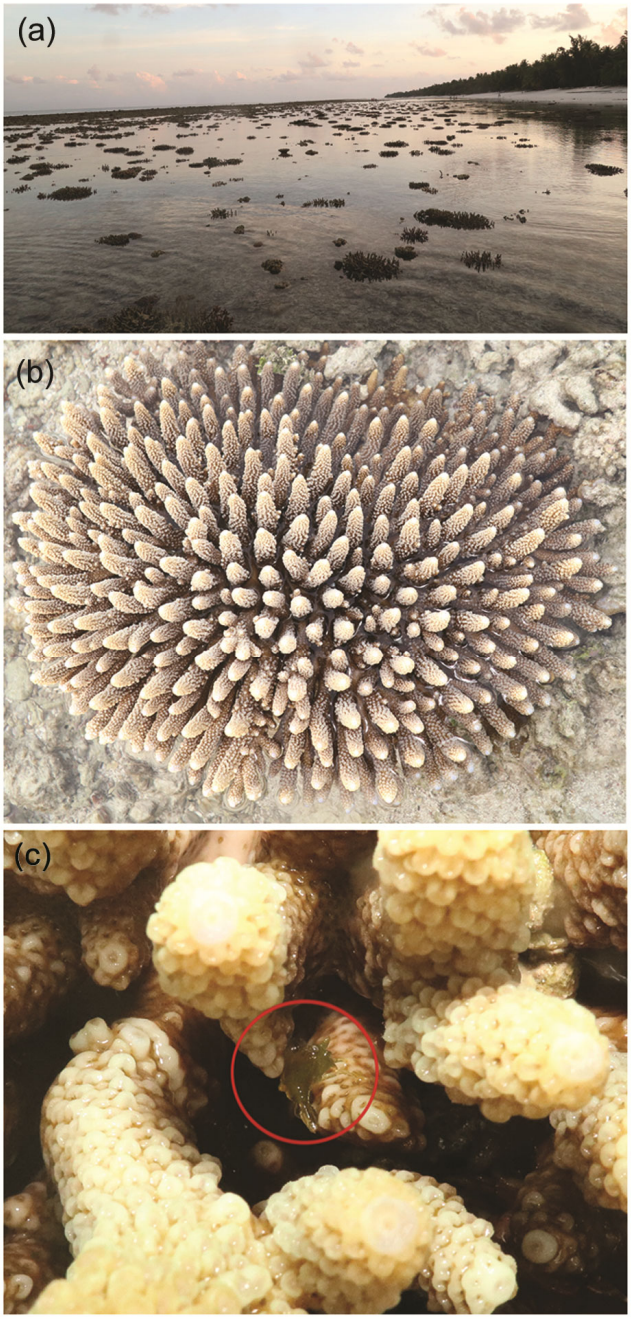

Fig. 2 — a) Low tide exposure at Agatti Island, Lakshadweep, India; b) Polyp stony coral, *Acropora* sp., where *Coralliocaris graminea* was collected; and c) Association of *C. graminea* with *Acropora* sp.

Fig. 3 — Dorsal and ventral view of male machine gun coral shrimp, *Coralliocaris graminea* (Dana, 1852) collected from Agatti Island, Lakshadweep, India

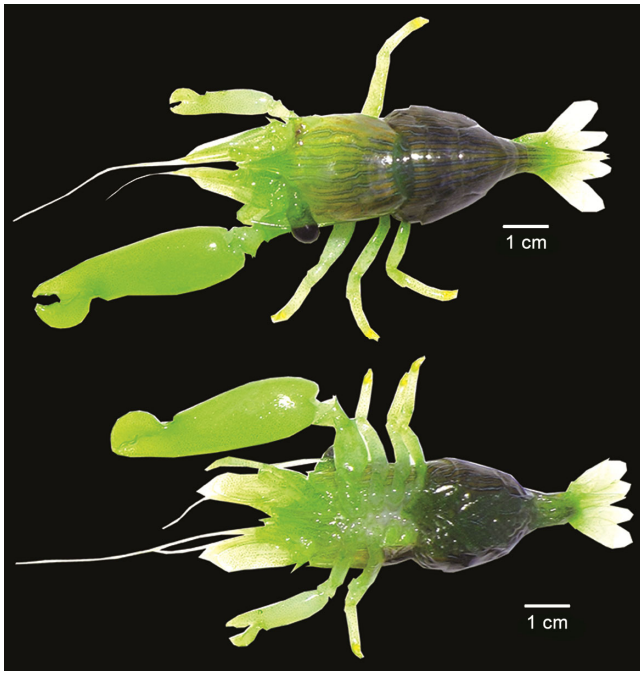

Fig. 4 — Dorsal and ventral view of female machine gun coral shrimp, *Coralliocaris graminea* (Dana, 1852) collected from Agatti Island, Lakshadweep, India

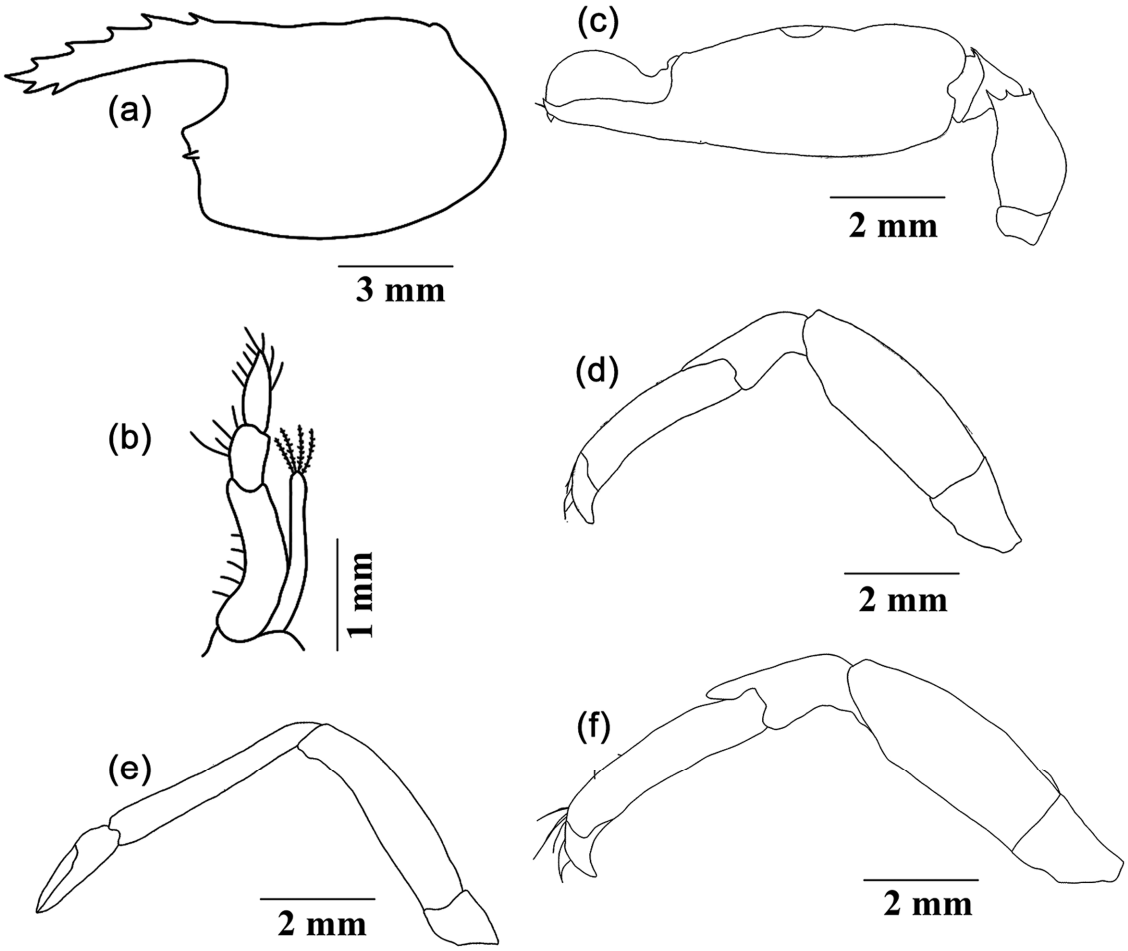

Fig. 5 — *Coralliocaris graminea* male: a) Carapace, b) Third maxilliped, c) First pereiopod, d) Second pereiopod, e) Third pereiopod, and f) Fourth pereiopod

consists of three pairs of terminal spines; intermediate spine long; dorsal margin of the telson with two pairs of spines. Uropod lateral margin bordered with long setae.

Colouration in life

The body is dark green with alternate fine longitudinal bluish-green stripes bordered by black, red and white chromatophores running from the anterior region of the carapace to the 6th abdominal segment. The ambulatory legs are green, with orange dactylus.

Known distributions

Andaman & Nicobar Islands[15], Gulf of Mannar[4] (India); Borneo (Southeast Asia); Christmas Island, Queensland (Australia); Dar es Salaam, Zanzibar (Tanzania); Fiji Islands (South Pacific); Hong Kong, South China Sea (China); Johnston Island; Loyalty Islands, New Caledonia; Mozambique; Palmyra; Red Sea, Suez; Saint John Island (United States); Ryukyu Islands (Japan); Samoa Islands (Polynesia); Seychelles; Talaud Island, Timor (Indonesia); Wake Islands[4,16].

Remarks

Coralliocaris genus is similar to *Jocaste* and *Periclimenes* genera but differs from the latter two in the shape of the 1st and 2nd pereiopods[3,30]. The present specimen agrees with the taxonomic description given by Bruce[16] and Jayachandran[4]. Bruce[16] stated that *C. graminea* falls under two types based on the rostrum shape: the first type has a smaller rostral lamina that reaches the middle of 2nd antennular peduncle, while the second type has a longer rostral lamina that exceeds the antennular peduncle. The specimens from the present study belong to the first type.

Previously, *Coralliocaris superba* was reported from the Andaman & Nicobar Islands. The

C. graminea exhibits similar morphology to *C. superba* in terms of mandible and maxillula characteristics. However, they can be easily distinguished based on their appearance. The *C. graminea* has a greenish body with green stripes running longitudinally (versus carapace and 1st to 4th abdominal somite exhibits white colouration in *C. superba*). Additionally, the dactylus of ambulatory pereiopods orange in *C. graminea* (versus ambulatory pereiopods dactylus pale brown with scattered reddish-brown chromatophores in *C. superba*).

Coralliocaris venusta is another species previously reported from the Gulf of Mannar, India. The *C. graminea* can be easily distinguished from *C. venusta* by the presence of 2 rostral teeth on the ventral margin (versus 1 small tooth in the ventral margin in *C. venusta*). But in the recent taxonomic revision, *C. venusta* is placed as a junior synonym of *C. nudirostris*[5].

Bruce[16] observed variation in chelae size of *Coralliocaris graminea.* He classified the chelae sizes into six categories, *viz*., very small regeneration bud (< 24 hrs), large regeneration bud (non-functional), small functional chela, chela of half size, well-developed chela (smaller in size) and full-sized chela (equal in size). Similarly, in the present study specimens, chelae are unequal in size; the male chela (Fig. 3) belongs to "chela of half size" and the female chela (Fig. 4) belongs to "small functional chela". The observed loss of chelae in larger populations, particularly among females, likely points to intra-specific interactions, potentially aggressive encounters or competition for space. This could indicate a form of territorial behaviour that might be more intense among females, possibly due to reproductive competition. Since males generally retain their chelae, it suggests that their encounters might be less confrontational, or perhaps males have less reason to engage in chela-damaging interactions[16]. Observing behaviour patterns or specific environmental pressures in these populations could provide more insights into this sexually dimorphic response to intraspecific interactions.

Discussion

According to Patton[30], *Coralliocaris graminea* is commonly observed in association with *Acropora* sp., a type of small polyp stony coral, which was also observed in the present study the shrimps were found in association with the live coral only and not in the dead coral (Fig. 2). Further, the shrimp's strong grasping behavior was noted with the live coral (*Acropora* sp.). During the survey and collection, any mutual associations with other animals, such as fishes or crabs was not observed. The collected live shrimp specimens were maintained in a glass tank (40 × 24 × 22 cm) with a water volume of 21.1 liters under controlled conditions due to their bright and striking colouration. Despite regular monitoring, both shrimp were found dead after seven days. The cause of mortality remains uncertain but could be attributed to the absence of live coral or suitable substrate. Madhavan *et al.*[32] stated that most of the ornamental shrimps collected from the wild, show lesser adaptability under the captive condition. Similarly, in the present study, the shrimps kept under captivity found dead even under controlled condition. The *C. graminea* is listed as Not Evaluated (NE) on the IUCN Red List of Threatened species[33]. The *C. graminea* possesses a natural defense mechanism from their predators, as they create a louder snapping sound through the quick closing action of their 2nd pereiopods[31]. Further, Anker & De Grave[31] also stated that, the distribution of *C. graminea* is still unknown and scanty due to morphological resemblance with its congeners.

Key to the genus *Coralliocaris* Stimpson, 1860

— Rostrum without teeth ……..…….…... 1
1a. Second pereiopod with convex movable finger ….....……. *C. brevirostris*
1b. Second pereiopod with smoothly sinuous movable finger ….....… *C. nudirostris*
1c. Second pereiopod with fixed finger …… *C. tridens*
1d. Second pereiopod finger with medial surface with well-developed flange forming longitudinal ridge ……..…..…..... *C. junckeri*
— Rostrum with 1 or 2 teeth on dorsal margin ……..... 2
2a. Fixed finger possessing plunger on opposable margin ……..…..... *C. macrophthalma*
— Rostrum with 3–6 teeth on dorsal margin …..... 3
3a. Colouration in life green with black, white, and red chromatophores with alternate longitudinal stripes …… *C. graminea*
3b. Body possessing fine longitudinal white-yellow stripes with dispersed yellow and red dots ……..……..……. *C. labyrintha*
3c. Body with fine black striate ……..…..… *C. sandyi*
3d. Third maxilliped with penultimate segment less than two times long as wide ……...……... *C. superba*
3e. Body consists of bright yellow, bearing longitudinal

orange striae composed of white, orange and brown chromatophores ..……..…...…. *C. taiwanensis*
3f. Body with black and yellowish-white chromnatophores ……..... *C. viridis*

Conclusion

The presence of *C. graminea*, in this region suggests that many more crustaceans, particularly shrimps, may inhabit the Lakshadweep islands, warranting further exploratory surveys.

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Conflict of Interest

The authors declare that there is no conflict of interest.

Ethical Statement

This study did not involve endangered or protected species, and no specific ethical approval was required.

Author Contributions

UPMN: Sample collection and image analysis; BS: Sample collection, photographs, and manuscript draft preparation; PRD & RC: Critical revision and correction of the manuscript; UKS: Supervision and overall guidance; and TTAK: Conceptualization, supervision, and critical inputs throughout the study.

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