



New records of hermit crabs, *Calcinus morgani* Rahayu & Forest, 1999 and *Diogenes klaasi* Rahayu & Forest, 1995 (Crustacea: Anomura: Diogenidae) from India

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Anomuran crabs, a group of attractive and ubiquitous organisms in Crustacea, are best described as having an assortment of adult body shapes from lobster-like to true crab-like; there is marked reduction of fifth pereopods that are not used as ambulatory appendages, the articulated or missing eighth thoracic sternite and the cephalothorax that is not fused to the epistome as it is in brachyurans (McLaughlin et al. 2010). Anomura is represented by seven super families: Aegloidea, Galatheaidea, Chirostyloidea, Hippoidea, Lomisoidea, Lithodoidea and Paguroidea. Super family Paguroidea includes hermit crabs and their relatives in the families Coenobitidae, Diogenidae, Paguridae, Parapaguridae, Pylochelidae and Lithodidae. Hermit crabs of the family Diogenidae, commonly called 'left handed

crabs' have appreciably larger left chela than right chela (McLaughlin et al. 2007). The genus *Calcinus* possesses triangular rostrum, without moveable rostriform process developed between ocular acicles, while the genus *Diogenes* has rostrum rounded or obsolete; with movable rostriform process, well developed or reduced, between ocular acicles (McLaughlin 2002). Two species of hermit crabs of the genus *Calcinus* (*C. herbstii* and *C. gaimardi*) and eight species of *Diogenes* (*D. avarus*, *D. costatus*, *D. custos*, *D. diogenes*, *D. merguensis*, *D. miles*, *D. planimanus* and *D. rectimanus*) have been recorded so far from India (Khan & Natarajan 1984; Thomas 1989). This paper records the occurrence of two species of hermit crabs, *Calcinus morgani* Rahayu & Forest and *Diogenes klaasi* Rahayu & Forest from the southwestern coast of India.

1. *Calcinus morgani* Rahayu & Forest, 1999 (Image 1 A–F)

Calcinus gaimardii Alcock, 1905: 56, pl 5, fig. 5 (not *Calcinus gaimardii* (H. Milne Edwards, 1848); *Calcinus gaimardi* Fize & Serene, 1955: 49 (in part), text figs.7,8, pl. 2, figs. 5,6; *Calcinus morgani* Rahayu & Forest, 1999: 465, figs. 1B, 2C, D, G, H, 3; - Komai, 2004: 35, figs 1-9; *Calcinus areolatus* Rahayu & Forest, 1999: 468, fig.4.

Materials examined: Five specimens, two males (shield length 7.1–8.0 mm), and three females (shield length 6.0–7.0 mm) collected from intertidal rocky pools of Thirumullavaram Beach, Kollam District, Kerala, India (08°53'32.5"N & 76°33'18.4"E). The reference materials are deposited at the Zoological Survey of India Regional Station, Kozhikode, Kerala (No. ZSI/WGRC/IR/INV/2326) and the museum collections of the Department of Aquatic Biology and Fisheries, University of Kerala (AR AN 5-6), India. The hermits were collected from the gastropod shells of *Trochus radiatus* and *Turbo brunneus*.

Diagnosis: Shield gray; ocular peduncles dark brown at proximal end and blue distally, with black rings below corneas. Antennular peduncles dark brownish-green and flagella light yellow. Antennal peduncle and flagella yellowish-orange. Chelipeds reddish-brown with white tips. Ambulatory legs

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Image 1. *Calcinus morgani* Rahayu & Forest, 1999
A - female, shield length 7.6mm – entire; **B** - ocular peduncle; **C** - left chela; **D** - right chela; **E** - third pereopod; **F** - telson

reddish-brown, with light brown propodi and dactyli; dactyls with white tips (Image 1A). Shield longer than broad with rostrum acutely triangular.

Ocular peduncles long, slender, overreaching both antennal and antennular peduncles (Image 1B). Ocular acicle terminating in a single spine. Antennular peduncle longer than antennal peduncle. Antennal acicle overreaching proximal margin of ultimate peduncular segment terminating in single spine and with 5–7 spines laterally. Fourth antennal segment with a small dorsodistal spine; the outer margin of the first segment with a bifid spine dorsolaterally and the inner margin with a simple spine. Chelipeds unequal, left larger than right. Outer surface of left chelae covered with closely-spaced tubercles becoming prominent on fixed finger and dactyl. Carpus with dorsodistal spine and prominent tubercle on middle proximal end (Image 1C). Right cheliped also with tubercles on upper surface of chela (Image 1D). Ambulatory legs smooth. Meri of second and third pereopods with a spine at inner distal portion. Carpi of both pereopods with strong dorsodistal spine with sometimes a small spine present below the dorsodistal spine on the second

pereopod. Dactyls shorter than propodi. Brush of long plumose setae on ventral margins of dactyls and distal part of propodus of third pereopod (Image 1E). Telson with 2–10 spines on left lobe and 1–4 on right lobe (Image 1F).

Remarks: *Calcinus morgani* is widely distributed in the Indo-Pacific; inter-tidal and sub-tidal waters of South Africa, Somalia, Madagascar, Australia, New Guinea, Indonesia, Malaysia, Vietnam, Southern Japan, Vanuatu, Marianas, French Polynesia, Fiji (McLaughlin et al. 2007). The present record of this species from the southwestern coast of India shows its extended distribution in the western Indian Ocean, from the eastern coast of Africa to India.

2. *Diogenes klaasi* Rahayu & Forest, 1995 (Image 2A–E)

Clibanarius padavensis Nateewathana et al. 1981: 51 (in part), 1981, Not *Clibanarius padavensis* De Man, 1888; *Diogenes klaasi* Rahayu and Forest 1995: 395, fig. 3; McLaughlin, 2002: 419, figs. 3D–F.

Materials examined: Two males (shield length



Image 2. *Diogenes klaasi* Rahayu & Forest, 1995
 A - male, shield length, 2.5mm – entire; B - ocular peduncle; C - left chela; D - second pereopod; E - Telson

2.5–2.7 mm) collected from the mangrove swamps of Dalavapuram (08°56'50.7"N & 76°33'17.2"E), Kollam District, Kerala, India. The reference materials are deposited at the Zoological Survey of India Regional Station, Kozhikode, Kerala (ZSI/WGRC/IR/INV/2086) and at the museum collections of Department of Aquatic Biology and Fisheries, University of Kerala (AR AN 7-8), India. The hermits were collected from the gastropod shell of *Cerithiacea cingulata* and *Turris nelliae*.

Diagnosis: Shield reddish-orange. Ocular peduncles light greenish-orange with antennules and antennae pale yellow. Chelipeds dark brownish-green. Ambulatory legs pale yellow with irregular dark green spots seen in different segments (Image 2A).

Shield longer than broad, rostrum bluntly triangular, not reaching up to ocular acicle projections. Ocular peduncles stout and cylindrical (Image 2B). Ocular acicle with 1–3 large spines and few smaller spinules. Antennular peduncle long, slender, overreaching corneas by 0.5 length of ultimate peduncular segment.

Antennal peduncle slightly shorter or longer than ocular peduncles; antennal acicles overreaching mid-length of fourth peduncular segment and with 3–4 marginal spines and additional spine on dorsal surface. Antennal flagella with long setae. Upper and lower margins of left cheliped with irregular row of spines. Palm convex; outer surface with small spines or tubercles and median longitudinal row of spines. Carpus spinulose on outer surface (Image 2C). Right chela slender. Carpus with dorsodistal spine. Ambulatory legs thin, slender and dactyls longer than propodi. Carpi of second and third pereopod with dorsodistal spine and additional spine at the proximal end of carpus of second pereopod (Image 2D). Chelipeds and ambulatory legs covered with long setae. Telson broad and asymmetrical with small median cleft. Left lobe larger than right with oblique terminal margin and 2–5 large spines laterally and few spinules; right lobe with 1–3 larger spines laterally and few smaller spinules on terminal margin (Image 2E).

Remarks: *Diogenes klaasi* was originally described

by Rahayu & Forest (1995) from Indonesian shallow waters. This species is also reported from western Thailand and Pakistan (Siddiqui et al. 2004). The present record of this species from the Ashtamudi Lake of Kerala State, India, shows its extended distribution in the Indian subcontinent.

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