

VOL. 65 NO. 02 JULY-DECEMBER 2023 • PRINT ISSN 0025-3146 • ONLINE ISSN 2321-7898

JMBAI

**JOURNAL OF THE MARINE
BIOLOGICAL ASSOCIATION OF INDIA**



MBAI
Marine Biological Association of India





First report of two species of Leucosiid crabs of the genus *Arcania* (Crustacea: Brachyura: Leucosidae) from Karnataka coast, India

A. Ahamed Rasheeq¹, Sanjay Kumar¹, R. Mridula^{1*} and K. M. Rajesh²

¹Karnataka Veterinary Animal and Fisheries Sciences University, College of Fisheries, Mangalore-575 002, India.

²Regional Centre of ICAR-Central Marine Fisheries Research Institute, Mangalore-575 002, India.

*Correspondence e-mail: mridularajesh789@yahoo.co.in

Received: 01 Oct 2022 Revised: 01 Feb 2023

Accepted: 27 Feb 2023 Published: 20 Nov 2023

Short Communication

Abstract

Two species of Leucosiid crabs of the genus *Arcania* were recorded from the Mangaluru coast of Karnataka. *Arcania gracilis* (Henderson, 1893) and *Arcania cornuta*, (MacGilchrist, 1905) have been reported all along the east coast and along Kerala in the west coast of India. This study reports the distribution of *A. gracilis* and *A. cornuta* along the Karnataka coast for the first time. The external characters were photographed and examined, and their taxonomic characteristics and distribution details are described briefly.

Keywords: *Leucosidae*, *Arcania gracilis*, *Arcania cornuta*, Karnataka, India, taxonomy

Introduction

Leucosiid crabs are commonly known as nut crabs or pebble crabs as they mimic small pebbles to conceal themselves in the sand and silty substrata along the littoral and marine habitats (Mohanty *et al.*, 2019). The highly polished carapace and thoracic sinus are unique identification features of these crabs (Poore, 2004). An Initial study on the Leucosiid crabs of India was done by Adams and White (1849), followed by Alcock (1895, 1896), who listed and described 83 species from their Royal Indian Marine Survey (RIMS) expedition. In addition, numerous studies have been conducted on the diversity of crabs inhabiting the Indian coastal waters (Chhapghar, 1957; Sankarankutty, 1965; Kakati, 1980; Sakai, 1983; Jeyabaskaran *et al.*, 2000; Roy and Nandi, 2008; Dineshbabu *et al.*, 2011; Sakthivel and Fernando, 2012; Pillai *et al.*, 2013; Kumar *et al.*, 2013). As per the report of Trivedi

et al. (2018), the highest number of species was recorded from the Andaman and Nicobar Islands (588), while the smallest number was from Goa and Karnataka State (82). The records indicated that the east coast of India, with 803 species, is more diverse than the west coast, having only 446 species of brachyuran crabs. This study reports two species of crab of the genus *Arcania* from the Mangaluru coast of Karnataka, southeastern Arabian Sea.

Material and methods

Six specimens of *A. cornuta* and a single specimen of *A. gracilis* were collected from the by-catch landings of trawlers at Mangalore Fishing Harbour in 2022. These specimens were brought to the laboratory, cleaned, photographed and preserved in 7% formaldehyde for further observation. The specimens were examined morphometrically using Vernier Caliper (0.01 mm accuracy) and were identified and described following Galil (2001) and Naderloo (2017). The specimens were deposited at the Department of Fisheries Resources and Management, College of Fisheries, Mangaluru, Karnataka.

Systematics

Class : Malacostraca (Latreille)
Order : Decapoda (Latreille, 1802)
Family : Leucosiidae (Samouelle, 1819)
Genus : *Arcania* (Leach, 1817)

***Arcania gracilis* Henderson, 1893 (Fig. 1)**

Holotype information

Type locality: Off Madras coast, Andaman Sea (Martaban), India (Alcock and Anderson, 1894). The genus was revised by Galil (2001), who confirmed that the two Indian Ocean species, *Arcania quinquespinosa* Alcock and Anderson, 1894, and *A. gracilis* Henderson, 1893, are subjective synonyms.

Synonyms

Arcania septemspinosa *gracilis*- Henderson, 1893. *Arcania quinquespinosa*- Alcock and Anderson, 1894; recorded this species from the Persian Gulf. *Arcania quinquespinosa*-Stephensen, (1945); recorded from The Gulf of Oman, Iran, *Arcania gracilis*-Galil, 2001.

Material examined

One single female specimen of *A. gracilis* of carapace length 11.5 mm was collected by Ahamed Rasheeq and Sanjay Kumar from the trawl landings of Mangaluru fishing harbour (Table 1, Fig. 1).

Description

The carapace is rhomboidal, broadly conical in outer, wider than long, carapace pink coloured, with a large rectangular cardiac region, a large bright red ocellus in the dorsal region of the carapace surrounded by rectangular milk white edges, the finger of chelipeds twice the length of palm, carapace with five spines—two lateral dorso-ventrally flattened stout spines on the wither side of the carapace and one intestinal spine on

Table 1. Morphometry (mm) of two species of *Arcania* from Karnataka

Morphometric characteristics	<i>Arcania comuta</i>		<i>Arcania gracilis</i>
	Male	Female	Female
Carapace length	19.39±28.4	21.70 ± 25.54	11.55
Carapace width	35.98 ± 50.80	45.24 ± 50.26	16.58
Lateral spine length	8.29 ± 12.76	9.59 ± 10.39	2.94
Merus of cheliped	16.04 ± 22.43	18.04 ± 22.42	10.59
Carpus of cheliped	5.02 ± 6.11	5.31	2.34
Propodus of cheliped	11.74 ± 17.41	14.29	5.49
Dactylus of cheliped	5.81 ± 7.23	6.81	7.22

the lower part of carapace supported by two small spines on the either posterior borders (Fig. 1). The morphometric details are given in Table 1.

Distributions and habitat

The species is distributed throughout Indo-West Pacific oceans (Madagascar, Red Sea, southern Oman, Persian Gulf, Gulf of Oman, Lakshadweep Islands, Sri Lanka, Arakan coast, Vietnam, China, Hong Kong, Taiwan, Philippines, Japan, Indonesia, Singapore, Australia, New Caledonia and Vanuatu) (Galil, 2001, 2007; Galil and Ng, 2007, 2010). It has been reported from both the east coast (Madras & Gulf of Mannar, Tamil Nadu; Visakhapatnam, Andhra Pradesh; Ganjam, Odisha) and west coast (Kerala) of India (Alcock, 1896; Kumar *et al.*, 2013; Rout *et al.*, 2019). Mostly found in the sandy substrate at water depths of 26-366 m (Naderloo *et al.*, 2017).

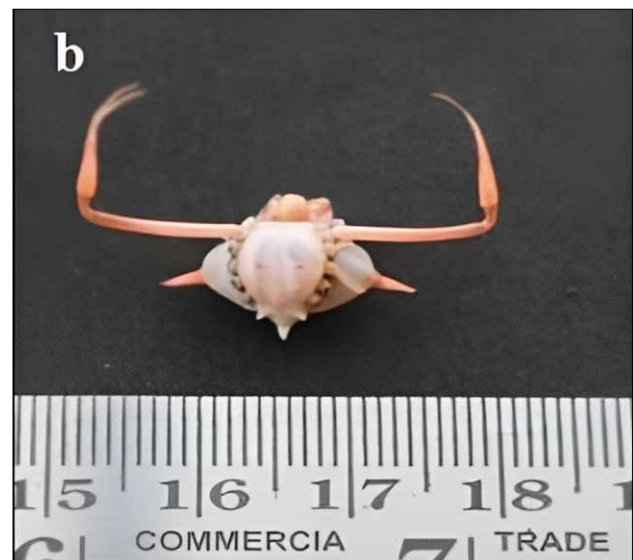


Fig. 1. *A. gracilis* (female): dorsal (a) and ventral (b) view

***A. cornuta* (MacGilchrist, 1905) (Fig. 2 and 3)**

Holotype information

Type locality: This species was originally described as *Ixoides cornutus* by MacGilchrist (1905) from The Persian Gulf. However, Galil (2001) reassigned it to the genus *Arcania*.

Synonyms

Ixoides cornutus—MacGilchrist, 1905. *Ixoides cornutus*—MacGilchrist, 1905; Stephensen, 1946; Titgen, 1982; Tan, 1996; Apel, 2001; Naderloo and Sari, 2005, 2007. *Arcania cornuta*—Galil, 2001: (in key).

Material examined

Six specimens of *A. cornuta* (4 males and 2 females) with carapace lengths differing from 19.39 ± 28.4 were collected by Ahamed Rasheeq and Sanjay Kumar from the trawl landings of Mangaluru fishing harbour dated 30/05/2022 (Table 2, Fig. 2 and 3).



Fig. 2. *A. cornuta* (Female) (a) dorsal and (b) ventral view

Description

The carapace is rhomboidal in shape and orange peach-coloured when alive; the carapace is smooth except for the gastric region being granulated. One large, robust lateral spine on both sides ringed with rounded perliform granules; posterior region of carapace consists of a single median tubercle, below which a pair of obtusely pointed, papilliform granulated constricted tubercles on either side, chelipeds are slender and longer, carpus and propodus smooth, merus are longer than the carapace in males, propodus is dorsoventrally flattened, thicker in the base and fingers are found to be filiform, half as margin of upper palm. Periopods are smooth subcylindrical and filliform, dactyls are setose anteriorly. The male abdomen is found to be elongated with four segments. Third abdominal segment longitudinally ovate and large in size, propodus of chelate leg narrowing towards the tip, slightly swollen with tubercles in subhepatic regions of either side. The most striking identifying feature of *A. cornuta* is the presence of one spiny process on either side of the carapace at the antero-lateral and posterior-lateral border. The antennae are about one-third the length of the antennule. The female specimens (Fig. 2) were bigger than the collected male specimens (Fig. 3).

Distributions and habitat

The species is distributed throughout the Indo-West Pacific: South Africa, Papua New Guinea, Mozambique Channel, Madagascar, Persian Gulf, Vietnam, China, Taiwan, Philippines, Japan, Solomon Islands, New Caledonia and Fiji (Galil, 2001). Along the Indian coast, it has been reported from Vishakapatnam (Devi *et al.*, 1988), Tamil Nadu (Krishnamoorthy, 2009) and Kollam (Devi *et al.*, 1988; Kumar *et al.*, 2013). They are found to inhabit along the subtidal sandy substrate at about 86-300 m (Naderloo *et al.*, 2017).



Fig. 3. *A. cornuta* (Male) (a) dorsal and (b) ventral view

Remarks

The genus *Arcania* (Leach, 1817) listed within the Leucosiid crabs comprises 22 species globally (Ng *et al.*, 2008), among which nine species were reported from Indian waters *viz.* *Arcania brevifrons* (Chen, 1989), *A. cornuta* (MacGilchrist, 1905), *A. erinacea* (Fabricius, 1787), *A. gracilis* (Henderson, 1893), *A. heptacantha* (De Haan, 1861), *A. novemspinosa* (Lichtenstein, 1816), *A. septemspinosa* (Fabricius, 1787), *A. tuberculata* (Bell, 1855) and *A. undecimspinosa* (De Haan, 1841 (Rout *et al.*, 2019). The morphology of *A. cornuta* in the present study closely agreed with the original description and illustrations of *Ixoides cornutus* (= *Arcania cornuta*) by MacGilchrist (1905) collected from the Persian Gulf, and the morphology of *Arcania gracilis* is similar to the original description of *A. septemspinosa* var *gracilis* (= *Arcania gracilis*) described from Andaman (Henderson, 1893). Both the collected specimens (*A. cornuta*, *A. gracilis*) were also verified with the recent description atlas of crabs of the Persian Gulf by (Naderloo *et al.*, 2017).

Results and discussion

A. gracilis can be easily differentiated from other species of *Arcania* by the rudimentary spines in the lower margin of the carapace and the presence of a unique red ocellus in the posterior end of the carapace surrounded by a white rectangular margin (Galil, 2001). Similarly, the presence of certain characteristics like short, stump-like intestinal spines; papillate posterior spines; infraorbital lobe not reaching frontal eaves; apex of third maxilliped exopod not reaching as far forward as endopod merus and significantly shorter cheliped fingers assist to distinguish *A. cornuta* from *A. gracilis*.

The presence of *A. gracilis* from three locations, namely Pudimadaka, Mutthukuru and Antarvedi of Vishakapatnam coast, is the only record of this species in this particular region after Alcock and Anderson (1894), who reported it twelve decades ago (Rout *et al.*, 2019). Nearly 22 species of crabs from the west coast of India were not recorded during the past 100 years since its first report (Dev Roy, 2013). Hence, it emphasizes the need for exploratory studies along the west coast of India.

The data on brachyuran crab diversity in Karnataka is very scarce except for a few publications by Sekharan *et al.* (1962), Ummerkutty and Deb (1968) and Dineshbabu (2005). Later, Dev Roy, 2013 reported and recorded the brachyuran crabs inhabiting the west coast of India, where fourteen species, *viz.*, *Myra fugax* (Leucosiidae), *Doclea hybrida*, *D. muricata* (Epiplatidae), *Charybdis annulata*, *C. feriatius*, *C. helleri*, *C. lucifera*, *C. variegata*, *C. hoplites* (Goniohellenus), *Thalamita crenata*, *Podophthalmus vigil* (Portunidae), *Metopograpsus latifrons* (Grapsidae), *Clistocoeloma merguense* and *Perisesarma bidens* (Sesamidae) were recorded to be the first report from the state of

Karnataka. The annotated checklist of brachyuran crabs of India by Trivedi *et al.* (2018) also confirms the presence of *A. gracilis* and *A. cornuta* only in the Kerala coast along the west coast of India. However, the present study reports the presence of two species of leucosiid crabs under the genus *Arcania* along the Karnataka coast.

Conclusion

The present study reveals the occurrence of two species of leucosiid crabs of the genus *Arcania* (*A. cornuta* and *A. gracilis*) from the Mangaluru coast of Karnataka, forming the first report for both species in Karnataka. The investigation underlines the need for further exploration of marine benthic diversity, especially along the lesser-known Karnataka coast.

Acknowledgements

The authors are thankful to the Dean, College of Fisheries, Karnataka Veterinary, Animal and Fisheries Sciences University, Mangaluru, Karnataka, for providing the necessary facilities to carry out the research work.

References

- Adams, A. and A. White. 1849. Crustacea. The Zoology of the voyage of HMS Samarang under the command of Captain Sir Edward Belcher during the years 1843-1846. *Part II, London*, p. 33-66.
- Alcock, A. and A. R. S. Anderson. 1894. Natural History Notes from H. M. Indian Marine Survey Steamer, "Investigator", Commander C. F. Oldham, R.N., commanding, series 2. No.17. List of the shore and shallow-water Brachyura collected during the season 1893-1894. *J. Asiat. Soc. Bengal*, 63 (2): 197-209.
- Alcock, A. 1895. Natural History notes from H.M. Indian Marine Survey Steamer, "Investigator", Commander R. F. Hoskyn, R. N. commanding. ser 11. No.1. On the result of the deep-sea dredging during the season of 1890-91. *Ann. Mag. Nat. Hist., Ser.*, 6 (13): 225-411.
- Alcock, A. 1896. Materials for a Carcinological Fauna of India. No. 2. The Brachyura Oxytomata. *J. Asiat. Soc. Bengal*, 65 (2): 134-296.
- Apel, M. 2001. *Taxonomie und zoogeographie der brachyura, paguridea und porcellanidae* (Crustacea: Decapoda) des Persisch-Arabischen Golfes (Doctoral dissertation, Frankfurt (Main), Univ., Diss., 2001). 268 pp.
- Chen, H. 1989. Leucosiidae (Crustacea, Brachyura). In: J. Forest (ed.), *Résultats des Campagnes MUSORSTOM*, Volume 5. Mémoires du Muséum national d'Histoire naturelle, Paris, Series A, 144 (5): 181-263.
- Chhappar, B. F. 1957. Marine crabs of Bombay State. Contribution No.1 of the Taraporevala Marine Biological Station, p. 1-89.
- Devi, K. N., K. Shyamasundari and K. H. Rao. 1988. A new record of *Ixoides cornutus* MacGilchrist, 1905 (Decapoda:Brachyura) from Indian waters. *J. Bombay Nat. Hist. Soc.*, 85: 651-653.
- Dev Roy, M. K. 2013. Diversity and distribution of marine brachyuran crab communities inhabiting West Coast of India. In: *Ecology and conservation of tropical marine faunal communities* Springer, Berlin, Heidelberg, p. 147-169.
- Dineshbabu, A. P. 2005. First record of the hairy crab, *Portunus (Monomia) gracilimanus* along the west coast of India. *Mar. Fish. Inf. Serv. T E Ser.*, 184: 16-17.
- Dineshbabu, A. P., N. R. Durgekar and P. U. Zacharia. 2011. Estuarine and marine decapods of Karnataka inventory. *Fish. Chimes*, 30 (10 & 1): 20-24.
- Fabricius, J. C. 1787. *Mantissa Insectorum sistenseorum species nuper detectas adjectis Characteribus genericis, Differentiis specificis, Emendationibus, Observationibus*, p. 1-348.
- Galil, B. S. 2001. A revision of the genus *Arcania* Leach, 1817 (Crustacea: Decapoda: Leucosioidea). *Zool. Med. Leiden*, 75 (11): 169-206.
- Galil, B. S. 2007. The deep-water Calappidae, Matutidae and Leucosiidae of the Solomon Islands, with a description of a new species of *Euclosia* Galil, 2003 (Crustacea, Decapoda, Brachyura). *Zoosystema*, 29: 555-563.

- Galil, B. and P. K. L. Ng. 2010. On a collection of calappoid and leucosioid crabs (Decapoda, Brachyura) from Vanuatu, with description of a new species of Leucosiidae. In: P. Castro, P. J. F. Davie, P. K. L. Ng and B. Richer de Forges (Eds.) Studies on Brachyura: a homage to Danièle Guinot. *Crustac. Monogr.*, 11: 139-152.
- Galil, B. S. and P. K. L. Ng. 2007. Leucosiid crabs from Panglao, Philippines, with descriptions of three new species (Crustacea: Decapoda: Brachyura). *Raffles Bull. Zool.*, Suppl., 16: 79-94.
- Henderson, J. R. 1893. A contribution to Indian Carcinology. *Trans. Linn. Soc. Lond.*, 5: 325-458.
- Jeyabaskaran, R., A. S. Khan and V. Ramaiyan. 2000. Biodiversity project on Gulf of Mannar biosphere reserve. Centre of Advanced Study in Marine Biology, Annamalai University, Parangipettai, India, p. 177-178.
- Kakati, V. S. 1980. *Studies on Crabs of Karwar*, Ph. D. thesis, Karnataka University Dharwad, Karnataka, p. 43-44.
- Krishnamoorthy, P. 2009. Brachyuran crabs from the collections of Marine Biological Centre. *Rec. Zool. Surv. India*, Occasional Paper No., 304: 1-46.
- Kumar, A., M. Sushilkumar and B. S. Galil. 2013. Calappid and Leucosiid crabs (Crustacea: Decapoda: Brachyura) from Kerala, India, with the description of a new species of *Mursia Desmarest*, 1823, from the Arabian Sea and redescription of *M. bicristimana* Alcock & Anderson, 1894. *Zootaxa*, 3746 (4): 529-551.
- MacGilchrist, A. C. 1905. Natural History Notes from the R.I.M.S.S. "Investigator", Capt. T. H. Hem-ing, R. N., commanding. Ser III. No. 6. An Account of the new and some of the rarer Decapod Crustacea obtained during the Surveying Seasons 1901-1904. *Ann. Mag. Nat. Hist.*, 16: 361-367.
- Mohanty, B., D. Raut, M. K. D. Roy, A. V. Raman, L. Patnaik, A. Nayak and S. S. Rout. 2019. First record of a Leucosid crab *Paranursiaab breviata* Bell, 1855 from Devi estuary, Odisha Coast, India. *Indian J. Geo Mar. Sci.*, 48 (1): 117-119.
- Naderloo, R. and A. Sari. 2005. Iranian Subtidal Leucosiid Crabs (Crustacea: Decapoda: Brachyura) of the Persian Gulf: Taxonomy and Zoogeography. *Iran. J. Anim. Biosyst.*, 1 (1): 28-43.
- Naderloo, R. and A. Sari. 2007. Subtidal crabs of the Iranian coast of the Persian Gulf: new collections and biogeographic considerations. *Aquat. Ecosyst. Health. Manag.*, 10 (3): 341-349.
- Naderloo, R. 2017. Atlas of Crabs of the Persian Gulf, Springer International Publishing AG, p. 1- 425.
- Naderloo, R., S. Ebrahimnezhad and A. Sari. 2015. Annotated checklist of the decapod crustaceans of the Gulf of Oman, northwestern Indian Ocean. *Zootaxa*, 4028 (3): 397-412.
- Ng, P. K. L., C. H. Wang, P. H. Ho and H. T. Shik. 2001. An annotated checklist of brachyuran crabs from Taiwan (Crustacea: Decapoda). *National Taiwan Museum Special Publication Series*, 11: 1-86.
- Ng, P. K. L., D. Guinot and P. J. F. Davie. 2008. Systema Brachyurorum: Part I. An annotated checklist of extant brachyuran crabs of the world. *Raffles Bull. Zool.*, 17: 1-286.
- Pillai, S. L., J. K. Kizhakudan and P. Thirumilu. 2013. Potential ornamental marine Brachyuran crabs available off Chennai. *Fish. Chimes.*, 33 (4): 70-73.
- Poore, G. C. 2004. Marine decapod Crustacea of southern Australia: A guide to identification. CSIRO publishing. Australia, p. 331-344.
- Rout, S. S., B. Dash, A. Bharathi, D. Raut, M. D. Roy, D. R. K. Sastry and A. Raman. 2019. Notes on three species of leucosiid crabs of the genus *Arcania* (Crustacea: Brachyura: Leucosiidae) off east peninsular India. *J. Mar. Biol. Ass. India*, 61 (1): 19-25.
- Roy, M. K. D. and N. C. Nandi. 2008. Checklist and distribution of Brachyuran crabs of West Bengal, India. *J. Environ. Sociobiol.*, 5 (2): 191-214.
- Sakai, T. 1983. Eight new species of Indo-Pacific crabs from the collections of the Smithsonian Institution. *Proc. Biol. Soc. Wash*, 96 (4): 623-631.
- Sakthivel, K. and A. Fernando. 2012. Brachyuran crabs diversity in Mudasa Odai and Nagapattinam coast of south east India. *Arthropods*, 1 (4): 136-143.
- Sankarankutty, C. 1965. On decapoda brachyuran from the Gulf of Mannar and Palk Bay. *J. Mar. Biol. Ass. India*, Mandapam Camp. January, Part 1: p. 348-362.
- Sekharan, K. V., M. J. Pradhan and K. K. Menon. 1962. On the occurrence of *Calappa philargius* (Linn.) in Indian waters. *J. Mar. Biol. Ass. India*, 4 (2): 239-240.
- Stephensen, K. 1945. The Brachyura of the Iranian Gulf. Danish scientific investigations in Iran, Part IV. *E. Munksgaard*, Copenhagen, p. 57-237.
- Stephensen, K. 1946. The Brachyura of the Iranian Gulf with an Appendix: The male pleopod of the Brachyura. In: Danish Scientific Investigations in Iran, Part 4. Copenhagen, *E. Munksgaard*: p. 57-237.
- Tan, C. G. S. 1996. Leucosiidae of the Albatross expedition to the Philippines, 1907-1910 (Crustacea: Brachyura: Decapoda). *J. Nat. Hist.*, 30 (7): 1021-1058.
- Titgen, R. H. 1982. *The systematics and ecology of the Decapods of Dubai, and their zoogeographic relationships to the Arabian Gulf and the Western Indian Ocean*. D Phil thesis, Texas A & M University, 269 pp.
- Trivedi, J. N., D. J. Trivedi, K. D. Vachhrajani and P. K. Ng. 2018. An annotated checklist of the marine brachyuran crabs (Crustacea: Decapoda: Brachyura) of India. *Zootaxa*, 4502 (1): 1-83.
- Ummerkutty, A. N. P. and M. Deb. 1968. Studies on the Crustacean Fauna of Mysore Coast 1. Decapoda: Brachyura. *Rec. Zool. Surv. India*, 66 (1-4): 191-196.