



New record of *Alpheus bisincisus* De Haan, 1844 (Caridea: Alpheidae) from the west coast of India

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Original Article

Abstract

The snapping shrimp *Alpheus bisincisus* De Haan, 1844 is reported for the first time from the southwest coast of India. Three specimens (one male and two females) were caught during demersal trawling survey conducted in areas between 9°40.7'N; 76° 05.8'E and 9°45.1'N; 76° 03.9'E at 33 m depth. The specimens were hidden in coral rocks sampled by the trawl net. The morphometric measurements of all the specimens sampled are compared with those of existing records from various parts of the world and the data are discussed.

Keywords: Snapping shrimp, *Alpheus bisincisus*, coral rock, new record, bottom trawl, southwest coast.

Introduction

Alpheus bisincisus De Haan, 1844 belonging to the family Alpheidae Rafinesque, 1815 is characterised by asymmetrical claws (Banner and Banner, 1982), of which, the larger one is capable of producing a loud snapping sound. There are about 627 species of snapping shrimps reported worldwide and around 283 species are in the genus *Alpheus* Fabricius,

1798 alone (Banner and Banner, 1982). In India, according to the recent checklist of shrimps (Radhakrishnan *et al.*, 2012; Samuel *et al.*, 2016), there are 23 species reported so far, under four genera, 3 species in the genus *Athanas* Leach, 1814; 15 species in the genus *Alpheus*; 4 species in the genus *Synalpheus* Bate, 1888 and a single species in the genus *Triacanthoneus* Anker, 2010. Occurrence of *A. bisincisus* has been reported from various seas including Indian Ocean (Coutiere, 1906; Barnard, 1950, 1957; Pearson, 1905, 1911; Man, 1911; Tiwari, 1963), Pacific Ocean (De Haan, 1849; Stimpson, 1861; Miers, 1879) and Australia (Banner and Banner, 1982). Further, there are several reports from Korean waters (Miers, 1879; Kim and Park, 1972; Kim, 1976; Kim *et al.*, 1981; Kim and Choe, 1982; Kwon, 1983; Min and Kim, 1991; Cha *et al.*, 2001; Soe *et al.*, 2004; Yang *et al.*, 2007). Banner and Banner (1982) reported *A. bisincisus* from Red Sea and Gulf of Aden. Thomas (1976) reported four species belonging to the genus *Alpheus* including *A. rapax*, *A. euprosyne*, *A. distinguendus* and *A. malabaricus* from Indian waters. The available literature indicates that *A. bisincisus* has not been reported from the Indian Seas. The present record therefore forms the first confirmed report of this species from southwest coast of India and also from the entire Indian Exclusive Economic Zone (EEZ).

Material and methods

Three specimens of *A. bisincisus* were caught during the bottom trawl survey from southwest coast of India by the vessel MFV *Matsya Varshini* of Fishery Survey of India during the month of April 2018. *Alpheus bisincisus* were collected during trawling operations made in between 9°40.7'N; 76°05.8'E and 9°45.1'N; 76°03.9'E at 33 m depth (Fig.1a). The shrimp specimens were collected from coral rocks of about 60 cm height (Fig.1b) using a trawl net. These rocks had many cavities which provided shelter for three crab species

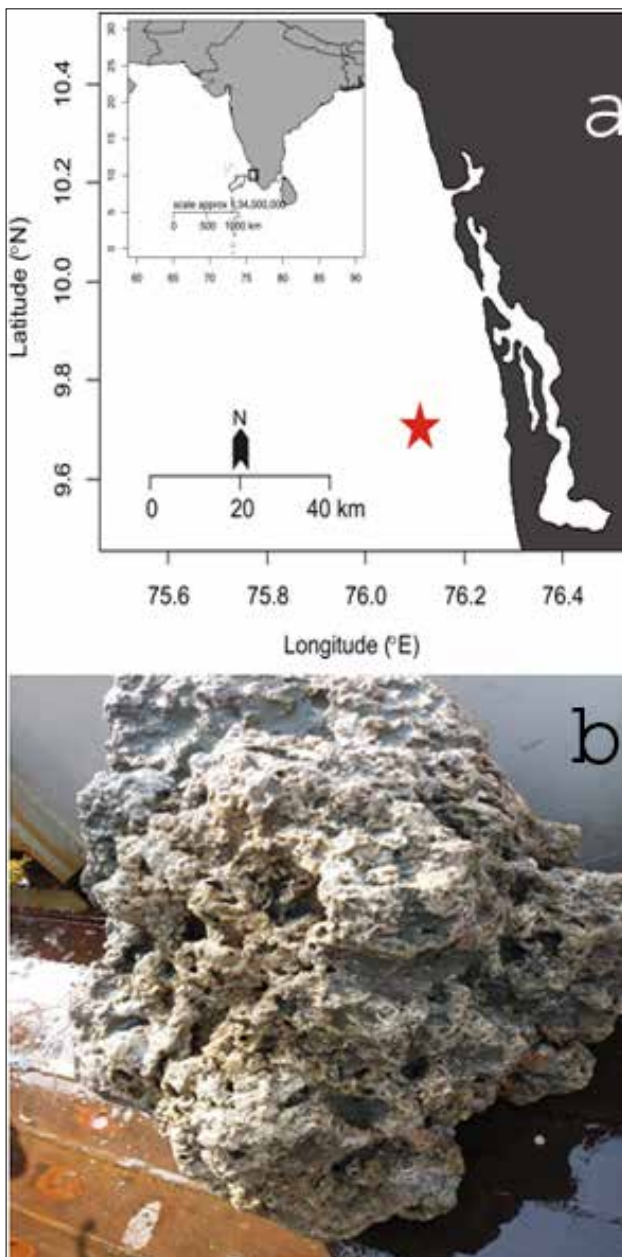


Fig.1a Map showing the sampling area b. Coral rock obtained during trawl net operation where the specimens were found.

of about 25 mm carapace width, one teleost species of the genus *Priolepis* and several species of polychaetes between other organisms. *A. bisincisus* was identified following Banner and Banner (1982) and Yang *et al.* (2007). Morphological characters of the specimens were compared with those of the specimens recorded elsewhere (Tiwari, 1963 and Yang *et al.*, 2007). Morphometric characters of *A. bisincisus* were studied following Banner and Banner (1982) and Yang *et al.* (2007) and the specimens were deposited in the marine museum of Fishery Survey of India, Kochi.

Results

Systematics

Order : Decapoda
 Family : Alpheidae
 Genus : *Alpheus* Fabricius, 1798
 Species : *Alpheus bisincisus* de Haan, 1844

Synonyms

Alpheus bis-incisus var. *malensis* Countiere, 1905
Alpheus bis-incisus var. *stylirostris* Countiere, 1905
Alpheus bis-incisus sub sp. *malensis* Countiere, 1905
Alpheus bis-incisus var. *variabilis* de Man, 1909
Crangon bis-incisus (De Haan, 1844)

Holotype : RMNH D5545 type locality Japan, De Haan, 1844
 Syntype : MNHP by Coutiere, 1905 as *Alpheus bisincisus malensis* type locality Maldive Islands
 Syntype : ZMA, type locality Indonesia by de Man, 1909 as *Alpheus bisincisus variabilis* de Man, 1909.

Description

Body not markedly compressed (Fig. 2a and 2b) and pterygostomial margin round. Cornea of eyes concealed on dorsal view and lateral view by anterior extension of carapace, the same not reaching to end of first antennular article. Rostrum triangular, sharp, flattened dorsally at distal end. The lateral margin of the rostrum overhanging and forms a deep orbito-rostral groove (Fig. 3a). Orbital hoods rounded and unarmed. Mouth parts not protruding; appendix masculina of second pleopods of male not reaching beyond end of endopod (Fig. 3g). Scaphocerite with strong distolateral tooth and the lateral margin concave (Fig.3a). Inferior shoulder on outer face of large chela with a sub-acute tooth (Fig. 3b and 3i). Exopod of third maxilliped is longer than ischiomerus (Fig. 3c). Males with balaeniceps dactylus. Body orange-red colour with large white bands on joints of pereopods. Three pairs of black dots

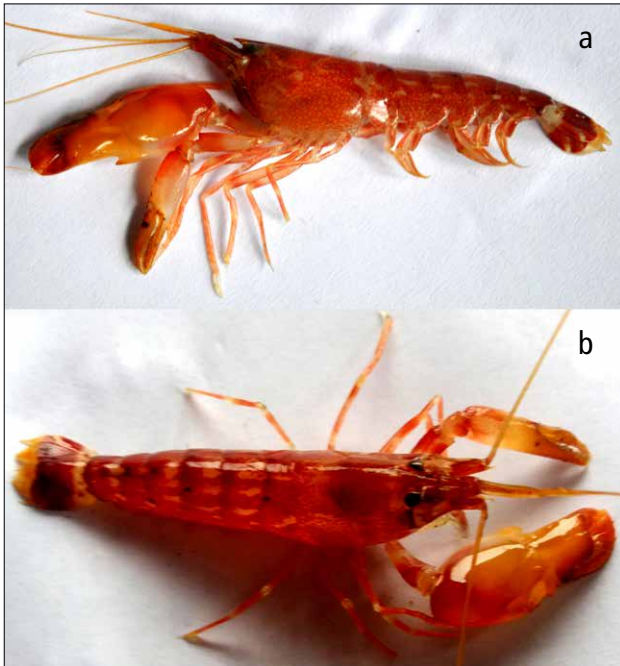


Fig.2a. Lateral view of *A. bisincisus* (male) b. dorsal view of *A. bisincisus* (male) 29.5 mm TL

on dorso-lateral side of the abdominal tergum. Uropod with white and yellow bands subsequently at the distal end.

Discussion

Rostrum 2.2 times as long as broad. Banner and Banner (1982) reported that this ratio ranges between 1.8 and 3.0 whereas Yang *et al.* (2007) observed 2 times long as broad in the specimens from Korean waters. Banner and Banner (1980) reported that this species can grow up to 2-7 cm.

Large chela with distinct shoulder on inferior margin proximal to base of fixed finger. There are no serrations or teeth on the fingers of large chela but a strong plunger on dactylus is present and that fits into socket of the base of propodus. Superior margin of large chela bearing transverse U-shaped groove proximal to dactylar articulation (Fig. 3b and 3i). A well-defined superior saddle with subacute proximal shoulder is present, which is overhanging on the transverse groove (Fig. 3i). Disto-inferior internal margin of the large chela with a subacute tooth (Fig 3b) that is projecting into outer face on the inferior shoulder. The chela is about 2.5 times lengthier than width. Tiwari (1963) and Yang *et al.* (2007) reported that the lengths of chela of specimens collected from Vietnam and Korean waters were 2.5 times that of its width, whereas Banner and Banner (1982) reported a length: width ratio of 2.4 for chela of specimens from Australian waters. Merus is about 2.6 times lengthier than width, a strong tooth on the

inferior margin present distally, whereas the merus was 2.4 times lengthier than its width for the specimens collected from Korean waters (Yang *et al.*, 2007).

Minor chela is sexually dimorphic, male has balaeniceps crest of hairs on dactylus (Fig.3d and 3e) and the chela is about 4.0 times lengthier than width. Yang *et al.* (2007) reported 3.6 times lengthier from Korean waters, whereas Banner and Banner (1982) stated that the ratio ranges between 2.3 and 4.0 based on review of specimens from different locations. Female specimens do not have balaeniceps hairs on the dactylus and dactylus is slightly lengthier than palm (Fig.3f).

First carpal segment of second pereopod is 1.4 times lengthier than second segment, which is 2.3 times lengthier than third

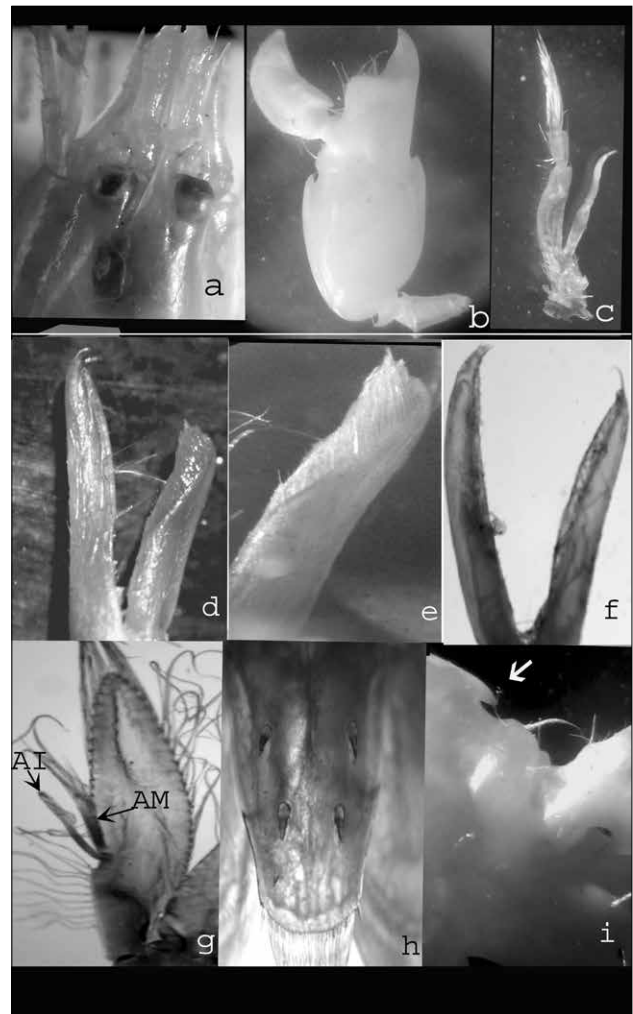


Fig. 3a. dorsal view of rostrum showing deep orbito-rostral groove, b. major chela c. third maxilliped d. minor chela of male e. Balaeniceps crest of hairs on dactylus of minor chela of male f. minor chela of female g. appendix masculine (AM) and appendix interna (AI) of male (indicated by black arrow) h. four spines on the dorsal side of telson i. proximal shoulder overhanging (white arrow) on the transverse groove of large chela.

Table 1. Morphometric measurements of *A. bisincisus*

Morphometric characters	Measurements (mm)	Proportions in Total length (%)
Total length	29.5	
Carapace length	8	27.12
Rostrum length	2.5	8.47
Rostrum width	1.2	4.07
II nd pereopod merus length	4.0	13.56
II nd pereopod Ischium length	4.5	15.25
II nd pereopod carpal article (I st /II nd /III rd /IV th /V th)	2.0/1.3/0.8/0.5/1.3	
II nd pereopod propodus length	2.0	6.78
III rd pereopod merus width	0.8	2.71
III rd pereopod merus length	4.9	16.61
Abdomen length	15	50.85
Major chela length	16.0	54.24
Major chela width	7.0	23.73
Major chela merus length	4.2	14.24
Major chela merus width	1.5	5.08
Major chela dactylus length	6.0	20.34
Major chela dactylus width	3.5	11.86
Major chela propodus length	15.5	52.54
Major chela propodus width	6.0	20.34
Minor chela length	11	37.29
Minor chela width	2.2	7.46
Minor chela merus length	6.0	20.34
Minor chela merus width	1.7	5.76
Minor chela dactylus length	4.8	16.27
Minor chela dactylus width	1.1	3.73
Minor chela propodus length	9.1	30.85
Minor chela propodus width	2.2	7.46
Telson length	3.7	12.54
Tip of telson width	1.7	5.76

segment, third and fourth segment are almost equal (Table 1), while the fifth segment is 0.42 times lengthier than first segment. The ratio of carpal segments of the present specimen is given by 10:7.1:2.7:2.7:4.0. Yang *et al.* (2007) reported that the first segment is 1.9 times lengthier than second segment and the second one is 2 times lengthier than the third one and the third and fourth carpal segments are equal, fifth segment is 0.4 times the first segment which is generally in agreement to the measurements of our specimens. Measurements of the present record are also corroborated with those of Australian specimens (Banner and Banner, 1982) where the carpal article of the second legs had the ratio of 10:7:2:2:3. Similarly, Tiwari (1963) reported the ratio of 16:10:5:4:7 for specimens from Vietnam.

Merus of third pereopod at most angular, with a movable spine on the proximal part of the ischium and merus is 6.1 times as

long as broad. Yang *et al.* (2007) reported the same ratio for Korean specimens, whereas it was 5.5 times of the specimen reported from Vietnam waters (Tiwari, 1963), however, Banner and Banner (1982) reported a ratio of 1:5 (length: breadth).

Abdominal pleura with rounded tip, telson rounded, 1.85 times long as broad, posterior margin arcuate. There are two pairs of large spines on the dorso-lateral side of the telson (Fig.3h). A pair of small non identical spines at the lateral end of the posterior margin of telson.

According to Yang *et al.* (2007) other sibling species of the genus *Alpheus* were discriminated from *A. bisincisus* by the rostrum and rostral-triangle of carapace flattened dorsally and sharply demarked and presence of overhanging orbitorostral groove. The present specimens also have the above morphological characters.

Alpheidae, snapping shrimps were collected from the sea wall and near shore rocks during low tide and they were found to occur in burrows shared by a gobiid fish (Thomas, 1976) in all instances reported from Indian waters, also from coral reefs and sponges, or mutualism with sea urchin in Red Sea (Gherardi 1991). Debelius, (2001) reported that *A. bisincisus* is free living, usually found under stones or sponges of tidal zone but the present record was from the sea bottom of 33 m depth confirming its distribution in deeper water habitats also.

Acknowledgements

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References

- Banner Albert, H. and Dora M. Banner. 1980. Some Small Collections of Alpheid Shrimp from the Indian Ocean, Including Two New Species of the Genus *Synalpheus Pacific Science, The University Press of Hawaii*, 33(1):25-35.
- Banner, Dora M. and Albert H. Banner. 1982. The alpheid shrimp of Australia Part III: The remaining alpheids, principally the genus *Alpheus*, and the family Ogryrididae. *Rec. Australian Mus.*, 34(1): 1–357.
- Barnard, K. H. 1950. Descriptive catalogue of South African Decapod, Crustacea. *Ann. S. Afr. Mus.*, 38: 361-392.
- Barnard, K. H. 1957. Additions to the faunal list of South African Crustacea. *Ann. Mag. Nat. Hist.*, (12) 10: 1-12.
- Cha, H. K., J. U. Lee, C. S. Park, C. I. Baik, S. Y. Hong, J. H. Park, D. W. Lee, Y. M. Choi, K. Hwang, Z. G. Kim, K. H. Choi, H. Sohn, M. H. Sohn, D. H. Kim and J. H. Choi. 2001. *Shrimps of the Korean Waters*. National Fisheries Research and Development Institute, Korea 188 pp.
- Coutiere, H. 1906. Marine Crustaceans. XV. Les Alpheidae, in *Gardiner's Faun. Geogr. Maldiv. Laccad.*, 2: 852-927.
- Debelius, H. 2001. Crustacea: Guide of the World. UnterFkwasserarchiv, IKAN, frankfurt, Germany.
- De Haan, W. 1849. Crustacea. In: von Siebold, P.F., (1833-1850). *Fauna Japonica sive Descriptio Animalium, quae in Itinere per Japoniam, Jussu et Auspiciis Superiorum, qui Summum in India Batava Imperium Tenent, Suspecto, Annis 1823-1830 Collegit, Notis, Observationibus et Adumbrationibus Illustravit.* i-xxi, ix-xvi, 1-243, Plates A-J, L-Q, 1-55, Lugduni-Batavorum.
- Gherardi, F. 1991. Eco-ethological aspects of the symbiosis between the shrimp *Athanas indicus* (Coutiere 1903) and the sea urchin *Echinometra mathaei* (de Blainville, 1825). *Trop. Zool.*, 4: 107–128.
- Kim, H. S., K. S. Lee, W. Kim and D. H. Kwon. 1981. A faunal and ecological study on the crustaceans in the intertidal zones near Incheon and southern part of Gangwha Island. *Bull. Kor. Assoc. Conser. Nat. Ser.*, 3: 278-309.
- Kim, H. S. 1976. A checklist of Macrura (Crustacea, Decapoda) of Korea. *Proc. Coll. Nat. Sci., SNU*, 1: 131-152.
- Kim, H. S. and B. L. Choe. 1982. An annual change of species composition and abundance of crustacean decapod community in eastern channel of Gang-wha Island. *Bull. Kor. Assoc. Conser. Nat. Ser.*, 4: 313-323.
- Kim, H. S. and K. B. Park. 1972. Faunal studies on the macrurans in Korea. R-72-82. In: Floral studies on some taxa of plants and faunal studies on some taxa of animals in Korea. Ministry of Science and Technology, Korea, p. 185-222.
- Kwon, D. H. 1983. Population dynamics of decapods communities in the eastern channel of Gangwha Island. *Bull. Kor. Assoc. Conser. Nat. Ser.*, 5: 93-103.
- Man, J. G. de. 1911. The Decapoda of the Siboga Expedition. Part II. Family Alpheidae. *Siboga Expedit. monogr.*, p. 133-465.
- Miers, E. J. 1879. On a collection of crustacean made by Capt. H. C. St. John R.N in the Korean and Japanese Seas. Part I Podophthalmia. *Proc. Zool. Soc. Lond.*, p. 18-61.
- Min. G. S. and W. Kim. 1991. A faunal and ecological study on crustacean decapods in the eastern channel of Kanghai Island. *Bull. Kor. Assoc. Conser. Nat., Ser.*, 11:11-36.
- Pearson, J. 1911. Ceylon Crustacea. Part I. Notes on the Alpheidae. *Spol. Zeyl. Colombo*, 7: 169-186.
- Pearson, J. 1905. On the Macrura, in: Herdman's Rep. Ceylon Pearl *Oyst. Fish.*, 4: 65-92.
- Radhakrishnan, E. V., V. D. Deshmukh, G. Maheswarudu, Jose Josileen, A. P. Dineshbabu, K. K. Philipose, P. T. Sarada, S. Lakshmi Pillai, K. N. Saleela, Rekhadevi Chakraborty, Gyanaranjan Dash, C. K. Sajeev, P. Thirumilu, B. Sridhara, Y. Muniyappa, A. D. Sawant, Narayan G Vaidya, R. Dias Johny, J. B. Verma, P. K. Baby, C. Unnikrishnan, N. P. Ramachandran, A. Vairamani, A. Palanichamy, M. Radhakrishnan and B. Raju. 2012. Prawn fauna (Crustacea: Decapoda) of India- An annotated checklist of the Penaeoid, Sergestoid, Stenopodid and Caridean prawns. *J. Mar. Biol. Ass. India*, 54(1): 50-72.
- Soe, I. S., Y. Eun and K. H. Oh. 2004. Benthic invertebrates from Sorae coast. *Kor. J. Nat. Conser.*, 2: 89-101.
- Stimpson, W. 1861. Prodrum descriptionis animalium everttebratum, quae in Expeditione ad Oceanum Pacificum, a Republica Federata missa, cadwaldaro Ringgold et Johanne Rodgers Ducibus, observavit et descripsit. *Proc. Acad. nat. Sci. Philad.*, (1860): 91-116.
- Thomas, M. M. 1976. *New records of four Alpheid shrimps from the Indian waters. J. Mar. Biol. Ass. India*, 18(3): 667-669.
- Tiwari, K. K. 1963. Alpheid shrimps (Crustacea: Decapoda: Alpheidae) of Vietnam. *Ann. Fac. Sci. Saigon*, p. 269-362.
- Samuel Deepak, Vijay Kumar, Chemmencheri Ramakrishnan Sreeraj, Pandian Krishnan, Chermanpandi Parthiban, Veeramuthu Sekar, Kanagaraj Chamundeeswari, Titus Immanuel, Patro Shesdev, Ramachandran Purvaja and Ramachandran Ramesh. 2016. An updated checklist of shrimps on the Indian coast, *J. Threatened Taxa*, 8(7): 8977–8988.
- Yang, H. J., Hyun Sook Ko and Won Kim. 2007. Redescription of *Alpheus bisincisus* De Haan (Decapoda: Alpheidae) from Korea. *J. Fish. Sci. Technol.*, 10(1): 37-42.