



# On distributional range extension of two species of brachyuran crabs *Parasesarma persicum* and *Austruca iranica* in Indian waters

Jigneshkumar Trivedi and Karesh Vachhrajani\*

Marine Biodiversity and Ecology Lab., Department of Zoology, Faculty of Science, The Maharaja Sayajirao University of Baroda, Vadodara-390002, Gujarat, India.

\*Correspondence e-mail: [karesh@gmail.com](mailto:karesh@gmail.com)

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## Abstract

The study records the presence of two brachyuran species viz. *Parasesarma persicum* Naderloo and Schubart, 2010 and *Austruca iranica* (Pretzmann, 1971) belonging to families Sesamidae and Ocypodidae respectively, for the first time from Indian waters. Both species were previously recorded from Persian Gulf, Gulf of Oman and adjacent area. In the present study a detailed morphological description of the species is given.

**Keywords:** Brachyuran crabs, mangroves, sesamidae, ocypodidae, Gujarat

## Introduction

Brachyuran crabs of family Sesamidae and Ocypodidae play an important role in the ecological functioning of mangrove and mudflat habitat (Khan *et al.*, 2005). Genus *Parasesarma* De Man, 1895 of family Sesamidae currently consists of 32 species

mainly occurring in the Indo-West Pacific region (Ng *et al.*, 2008; Rahayu and Ng, 2009, 2010; Naderloo and Schubart, 2010) out of which only two species *Parasesarma plicatum* (Latreille, 1803) and *Parasesarma pictum* (De Haan, 1835) are reported from India (Chhapgar, 1957; Dev Roy and Das, 2000; Khan *et al.*, 2005; Dev Roy, 2013). The brachyuran crab species of genus *Austruca* Bott, 1973 of family Ocypodidae are commonly known as fiddler crabs and distributed in tropical and subtropical regions (Crane, 1975; Zeil *et al.*, 2006; Ng *et al.*, 2008; Barnes, 2010). A total of 6 species of *Austruca* were so far reported from Indian waters (Crane, 1975; Chhapgar, 1957; Khan *et al.*, 2005; Trivedi *et al.*, 2012; Dev Roy, 2013). In the present study, two brachyuran crab species viz. *Parasesarma persicum* Naderloo and Schubart, 2010 and *Austruca iranica* (Pretzmann, 1971) are reported for the first time from Indian waters.

## Material and Methods

The present study was carried out as a part of research project on documentation of crustacean fauna of Gujarat. Total 14 male and 1 female specimens of *P. persicum* and 4 male and 3 female specimens of *A. iranica* (Pretzmann, 1971) were collected from different coastal areas of Gujarat state comprising of mangrove and mudflat habitats. Hand picking method was adopted for specimen collection during the low tide time. Specimens were

washed properly to remove the sediment and photographs of the fresh specimens were captured in the field (Canon 1000D; 18-55 mm lens). Specimens were preserved in 70% alcohol and deposited in the Zoology Museum of Department of Zoology, Faculty of Science, The M. S. University of Baroda, Vadodara, Gujarat, India with accession numbers ZL-AR-CR-84 and ZL-AR-CR-88 allotted to the specimens of *A. iranica* and *P. persicum* respectively. The specimens were measured (in millimeters) in terms of maximum carapace width (CW) and carapace length (CL) respectively. The abbreviation G1 and Coll. is used for male first left gonopod and collector of specimens respectively.

## Results and discussion

In this study presence of two brachyuran species viz. *P. persicum* and *A. iranica* belonging to families Sesamidae and Ocypodidae, respectively are reported for the first time in Indian waters.

### Systematic accounts

Family : Sesamidae Dana, 1851

Genus : *Parasesarma* De Man, 1895

*Parasesarma persicum* Naderloo & Schubart, 2010

*Parasesarma persicum* Naderloo and Schubart, 2010: Type locality: Persian Gulf.

### Material Examined

1♂, ZL-AR-CR-88 (CW- 22.43 mm, CL- 17.93 mm), Jakhau (230 13' 23" N; 680 37' 35" E), Gujarat, India, mangrove habitat, 7th July, 2015 (Coll. Jignesh Trivedi and Gunjan Soni). 2♂, (ZL-AR-CR-88 [1, 2]) (CW- 23.33 mm, CL-19.82 mm; CW- 24.61 mm, CL-20.74 mm), Jakhau (230 13' 23" N; 680 37' 35" E), Gujarat, India, mangrove habitat, 15th March, 2015 (Coll. Jignesh Trivedi and Gunjan Soni).; 2♂, (ZL-AR-CR-88 [3,4]) (CW- 22.10 mm, CL-18.72 mm; CW- 17.78 mm, CL- 14.43 mm), Jarapara (220 46' 48" N; 690 38' 36" E), Gujarat, India, mangrove habitat, 20th February, 2011 (Coll. Jignesh Trivedi and Ravi Vasava); 1♂, (ZL-AR-CR-88 [5]) (CW- 18.96 mm, CL- 15.80 mm), Sikka (220 27' 03" N; 690 49' 47" E), Gujarat, India, mangrove habitat, 28th March, 2011 (Coll. Jignesh Trivedi and Ravi Vasava). 2♂, (ZL-AR-CR-88 [6, 7]) (CW- 16.94 mm, CL- 13.87 mm; CW- 18.99 mm, CL- 15.52 mm), Jodiya (220 43' 58" N; 700 16' 53" E), Gujarat, India, mangrove habitat, 15th April, 2011 (Coll. Jignesh Trivedi and Ravi Vasava). 2♂ (ZL-AR-CR-88 [8-9]) (CW- 18.38 mm, CL- 14.83 mm; CW- 16.99 mm, CL- 14.08 mm), Umarsadi (200 31' 52" N; 720 53' 14" E), Gujarat, India, mangrove habitat, 10th June, 2014 (Coll. Jignesh Trivedi and Gunjan Soni). 4♂ (ZL-AR-CR-88 [10-13]) (CW- 14.79 mm, CL- 12.46 mm; CW- 16.20 mm, CL- 13.53 mm; CW- 12.13 mm, CL- 9.62 mm; CW- 10.02 mm, CL- 7.98 mm) Kolak (200 31' 52" N; 720 53' 14" E), Gujarat, India, mangrove habitat, 10th June, 2014 (Coll. Jignesh Trivedi and Gunjan Soni). 1♀ (ZL-AR-CR-88 [14])

(CW- 20.53 mm, CL- 16.13 mm), Umarsadi (200 31' 52" N; 720 53' 14" E), Gujarat, India, mangrove habitat, 10th June, 2014 (Coll. Jignesh Trivedi and Gunjan Soni).

### Description (modified from Naderloo and Schubart, 2010)

Carapace squarish (Fig.1a), 1.28 times as broad as long; dorsal surface of carapace smooth, relatively convex; carapace regions well defined; front deflexed; four lobed; lobes separated by narrow deep groves, median groove extending to gastric region, low depression separating cardiac region from intestinal region; six ridges on posterolateral region, smooth, curved and of different sizes. Exorbital angle triangular, acute, lateral margin straight or slightly divergent. Eye stalk relatively short. Third maxillipeds long with large gap between, ischium and merus nearly same in length, exopod narrow and short (Fig. 2c).

Cheliped equal to sub equal (Fig.1b), large, ischium with small granules on anterior margin. Granulated ridges present on outer margin of merus, inner surface smooth, sub distal tooth large and triangular. Carpus with produced anterior angle, outer surface with transverse line of small granules. Palm with outer surface granulated (Fig. 2a), two prominent transverse pectinated crests present on the upper surface, primary crest with 14-16 broad teeth (Fig. 2b), secondary crest well developed with 12-14 broad teeth; inner surface granulated with row of tubercle present near the base of movable finger. Movable finger slightly arched downward with 10-12 large tubercles on upper margin (Fig. 2a, 2b), proximally large and oval and distally becoming small and round; 12-14 small tubercles

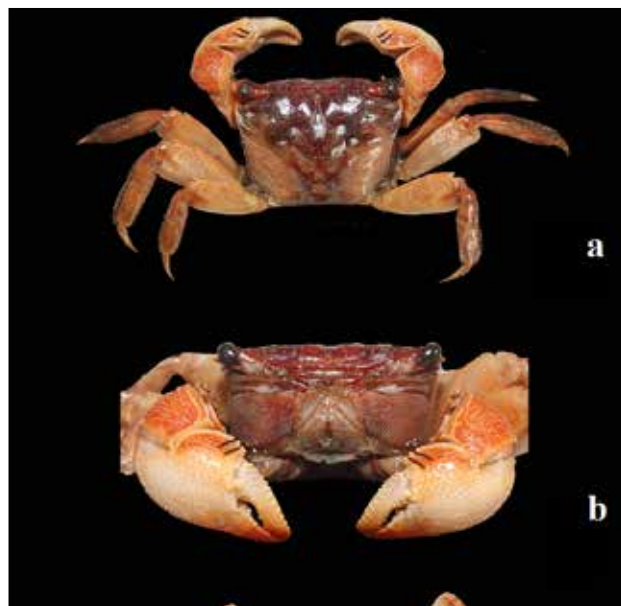


Fig. 1. *Parasesarma persicum* Naderloo & Schubart, 2010, Male (ZL-AR-CR-88) (CW- 22.43 mm, CL- 17.93 mm), Gujarat, India. Overall habitus (a) Dorsal view (b) Frontal view (c) Ventral View

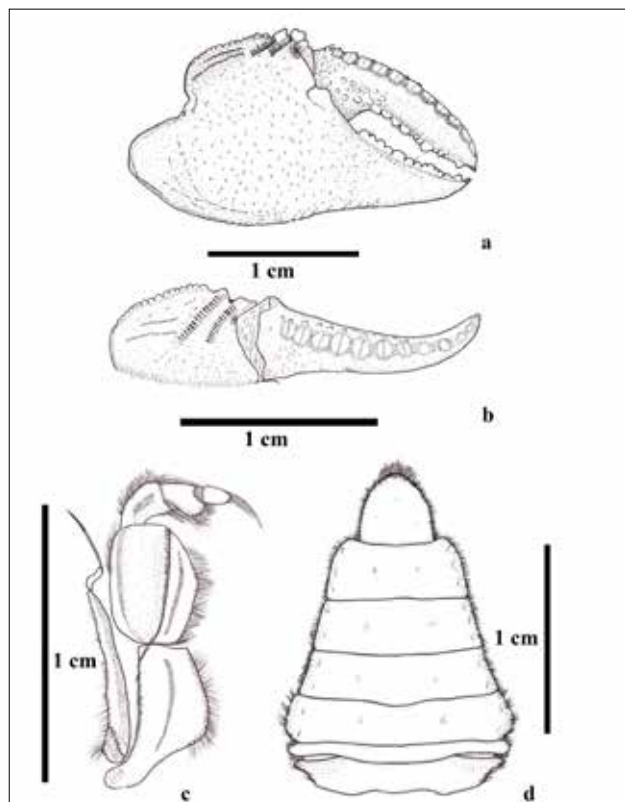


Fig. 2. *Parasesarma persicum* Naderloo & Schubart, 2010, Male (ZL-AR-CR-88) (a) Major chela outer surface (b) Major chela upper surface (c) Third maxilliped (d) Abdomen

present along the inner part of large tubercles on proximal part of movable finger, cutting edge of the finger with teeth of varied size, blunt. Female chelipeds smaller than male, less granulated, without pectinated crest on the palm.

Walking legs medium sized, flattened, merus of second leg about 1.9 times as long as wide (1.70-1.94, N=15), merus of fifth leg 1.8 times as long as wide, anterior margin serrated with sub distal spine, posterior margin smooth, posterior surface with transverse ridges. Carpus of second leg with two carinae and that of fifth leg with single carinae on posterior surface, carpus of second leg with one carinae on anterior surface, no carinae on anterior margin of carpus of fifth leg. Propodus of second leg with carinae on posterior and anterior margin, no carinae on propodus of fifth leg. Propodus of second leg 2.2 times as long as wide (1.99-2.46, N=15), that of fifth leg 2.3 times as long as wide (2.15-2.56, N=15). Dactylus cylindrical, without spine, with few hairs on posterior surface. Dactylus of second leg 4.2-4.8 times as long as wide (N=15), that of fifth leg 4.8-5.0 times as long as wide (N=15).

Male abdomen triangular, short, third segment widest, telson small, little longer than sixth segment, margins of segments covered with short setae (Fig. 2d). Male G1 stout, straight (Fig.

3a), apical lobe curving outside dorsally with long chitinous process, chitinous process curved at angle of 45° (Fig. 3b), slightly concave basally on mesial surface, lateral surface with distinct depression. Female genital opening located in depression of anterior age of sternite 5, with operculum in anterior part (Fig. 3c).

Carapace and walking leg dark green to grey, carapace always more darker than legs, chelipeds with cream colored basis, upper surface of carpus and palm dark orange to reddish brown, fingers with bright orange colored tips.

Distribution: The species is so far reported from Persian Gulf, Gulf of Oman and Iraq (Naderloo and Schubart, 2010; Naser, 2011) and now it is reported from Gujarat, India.

Remarks: The specimen collected in the present study agrees well with the original description of the species given by Naderloo and Schubart (2010). In most of the male specimen used in the present study, the length of the chitinous process of male G1 was longer than the type material. The flagellum of third maxilliped was also longer in the present material as compared to the type material. The number of teeth in the primary pectinated crest (14-16 teeth) is more in the present study material as compared to the type material (13 teeth). Chhappgar (1957)

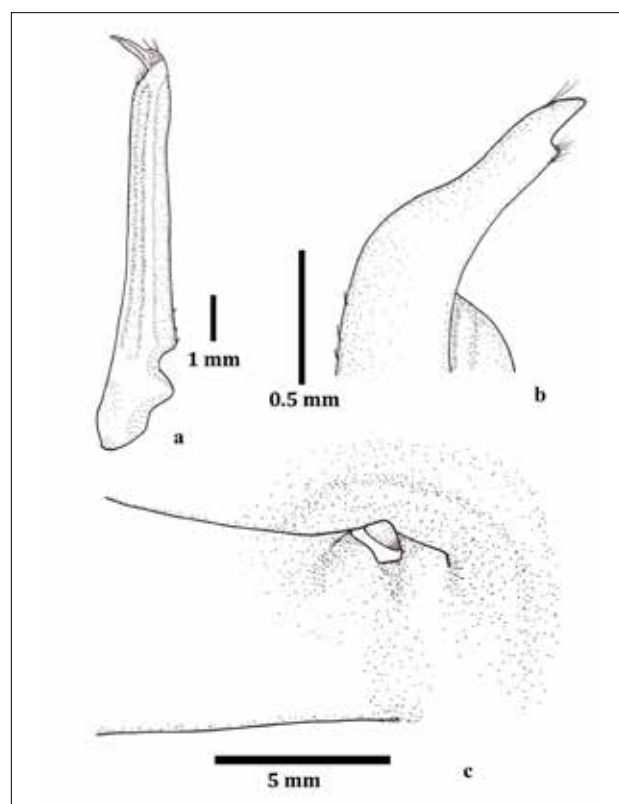


Fig. 3. *Parasesarma persicum* Naderloo & Schubart, 2010 (a) Male G1 (b) Male G1 apical lobe (c) female gonopore.

identified the specimens collected from Umarsadi and Kolak located on coastal areas of Gujarat state, India as *Sesarma (Serama) quadrata* (Fabricius, 1978) (= *Parasesarma plicatum* (Latreille, 1803)). In the present study few specimen were also collected from those two sites and identified as *P. persicum*. So it may be possible that the population living in those sites is of *P. persicum* Naderloo and Schubart, 2010 and not of *P. plicatum* (Latreille, 1803). Total 2 species of *Parasesarma* are reported from India and present study adds one more species, *P. persicum* in the list. The morphological comparison of these species is given in Table 1.

Table 1. Comparison of distinguishing characters of different species of *Parasesarma* De Man, 1895 recorded from India

Character	* <i>Parasesarma persicum</i> Naderloo & Schubart, 2010	* <i>Parasesarma plicatum</i> (Latreille, 1803)	* <i>Parasesarma pictum</i> (de Haan, 1835)
Carapace	1.26 times wider than long	1.27 times wider than long	1.13 times wider than long
Cheliped	Dorsal surface of dactylus with 11-13 tubercles	Dorsal surface of dactylus with 11-14 tubercles	Dorsal surface of dactylus with 18-19 tubercles
G1	Apical process long	Apical process long	Apical process short

\*Reference Naderloo and Schubart, 2010; Rahayu and Ng, 2010, de Haan, 1835

**Systematic accounts**

Family : Ocypodidae Rafinesque, 1815  
 Sub family : Gelasiminae Miers, 1886  
 Genus : *Austruca* Bott, 1973

*Austruca iranica* (Pretzmann, 1971) (Fig. 4, 5)

*Uca annulipes iranica* Pretzmann, 1971: 481. Type locality: Bandar-Abbas, Iran

*Uca iranica* – Shih *et al.*, 2009: 377–382.

*Austruca iranica* – Naderloo *et al.*, 2010: 14–19, figs. 6c–f, 7a, 8a, 9a–k; Naderloo and Tükay, 2012: 54. Shih *et al.*, 2016: 153, fig. 8c. Naderloo, 2017: 413–414, figs. 37.11, 37.13b

**Material Examined**

1 ♂, ZL-AR-CR-84 (CW- 19.35 mm, CL- 12.06 mm), Pirotan Island (220 36' 17" N; 690 57' 13" E), Gulf of Kachchh, Gujarat, India, mangrove habitat, 10th July, 2015 (Coll. Jignesh Trivedi and Gunjan Soni). 3 ♂ ZL-AR-CR-84 (1-3) (CW- 15.23 mm, CL- 10.13 mm; CW- 12.50 mm, CL- 7.46 mm; CW- 14.83 mm, CL- 7.61 mm), Pirotan Island (220 36' 17" N; 690 57' 13" E), Gulf of Kachchh, Gujarat, India, mangrove habitat, 10th July, 2015 (Coll. Barkha Purohit and Dhruva Trivedi). 3 ♀ ZL-AR-CR-84 (4-6) (CW- 10.76 mm, CL- 12.06 mm; CW- 14.73 mm, CL- 8.99 mm; CW- 15.52 mm, CL- 9.95 mm), Pirotan Island (220 36' 17"

N; 690 57' 13" E), Gulf of Kachchh, Gujarat, India, mangrove habitat, 10<sup>th</sup> July, 2015 (Coll. Barkha Purohit and Dhruva Trivedi).

**Description (modified from Naderloo *et al.*, 2010)**

Carapace smooth, Front broad, venterolateral margin nearly straight (Fig.4a), distinctly crested, posterolateral margin crested, extending curvedly backwards. Exorbital angle triangular, directed forward; upper orbital margin sinous with two crests, lower margin regularly granulate, granules become larger towards outer margin. Third maxilliped with merus 1/3 length of ischium, ischium with broad longitudinal groove, long setae on inner margin of ischium and merus.

Merus of major chela with transverse ridges on upper margin, finely granulated, lower margin denticulate. Carpus about 1.5 times as long as broad, outer, inner and dorsal surfaces smooth and glabrous. Outer surface of palm with depression near the base of fixed finger (Fig.4b, 5a), lower margin weakly granulated, upper margin granulated, inner surface with oblique tuberculate ridge (Fig. 5b), granules becoming small towards

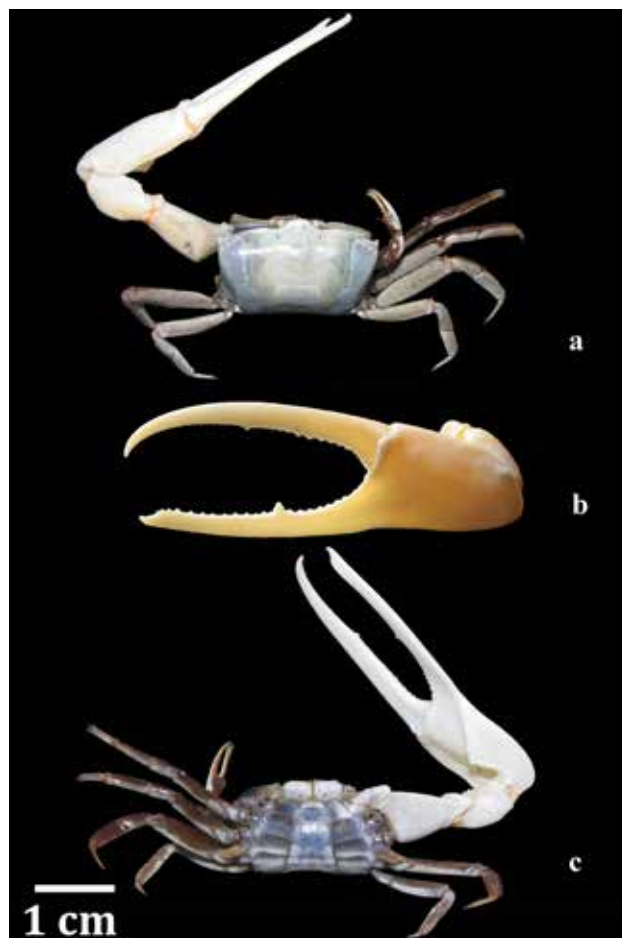


Fig. 4. *Austruca iranica* (Pretzmann, 1971), Male (ZL-AR-CR-84) (CW- 19.35 mm, CL- 12.06 mm), Gujarat, India. Overall habitus (a) Dorsal view (b) Major chela palm (c) Ventral View



distal end, two parallel ridges near the dactylus base, proximal ridge with large granules, distal ridge small granules. Dactylus more than 2 times as long as broad, with subproximal tooth, median teeth located centrally, fixed finger with large tooth located on proximal third, subdistal tooth small (Fig. 5a, 5b).

Merus of walking leg with granulated ridges on anterior margin, posterior margin serrated proximally, propodus 1.2 times as long as carpus; dactylus as long as carpus; brown bristles present on anterior and posterior surface of propodus and dactylus (Fig. 5c); male abdomen becoming narrow towards 5 segment, segment 6 with lateral margin almost straight (Fig. 4c).

Male G1 with main shaft bending in postrolateral direction (Fig. 5e), palp not reaching the base of horny bilobed endpiece; dorsal lobe large, slightly longer than ventral lobe, genital opening located in the midline of both the lobes (Fig. 5f); setae present along the lateral margin, short setae on the palp. Female genital opening with operculum located parallel to median line of sternum (Fig. 5f).

Carapace light blue, larger cheliped off white, smaller cheliped brown on dorsal side, ventral side off white; walking legs with dark brown inner margin, outer margin off white; abdomen and sternum somites light blue with dark brown and blue patches.

### Distribution

The species is so far reported from Persian Gulf, Gulf of Oman and Pakistan (Pretzmann, 1971; Naderloo *et al.*, 2010; Saher *et al.*, 2014) and now it is reported from Gujarat, India.

### Remarks

The specimen collected in the present study agrees well with the description given by Naderloo *et al.* (2010) and Saher *et al.* (2014). The oblique tuberculated ridge present on the inner margin of the palm in the specimen observed in the present

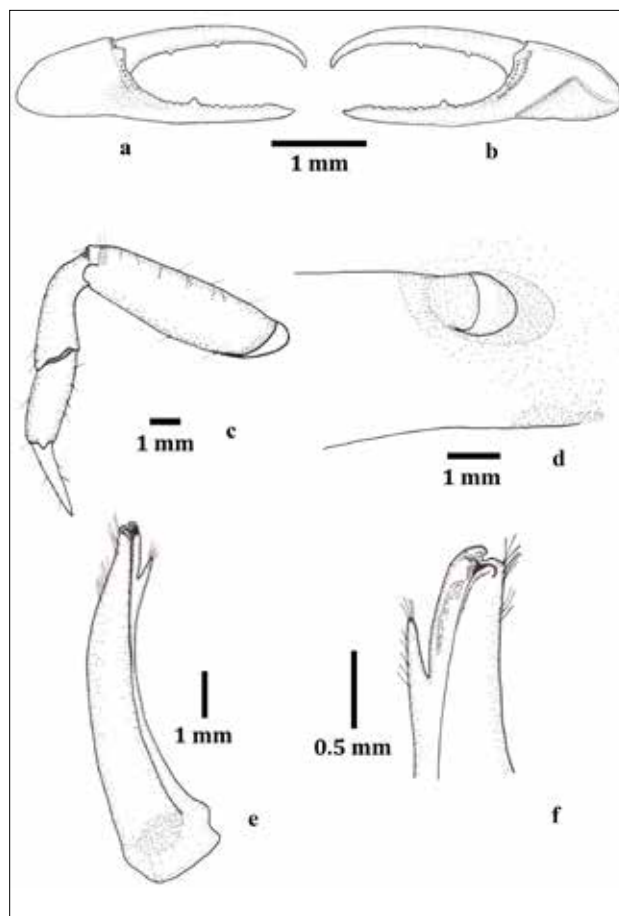


Fig. 5. *Austruca iranica* (Pretzmann, 1971), (a) Major chela palm outer view (b) Major chela palm inner view (c) 4th walking leg (d) Female gonopore (e) Male G1 (f) Male G1 apical lobe

study was quite longer with more tubercle than that of in Iranian specimen (Naderloo *et al.*, 2010). The median tooth and subproximal tooth of the dactylus of major chela were also smaller in size compared to Iranian specimen (Naderloo *et al.*, 2010). *A. iranica* was originally described as a subspecies

Table 2. Comparison of distinguishing morphological characters of different species of *Austruca* Bott, 1973 recorded from India

Character	* <i>A. lactea</i> (De Haan, 1835)	* <i>A. annulipes</i> (H. Milne Edwards, 1837)	* <i>A. bengali</i> (Crane, 1975)	* <i>A. iranica</i> (Pretzmann, 1971)	* <i>A. perplexa</i> (H. Milne Edwards, 1852)	* <i>A. sindensis</i> (Alcock, 1900)	* <i>A. triangularis</i> (A. Milne-Edwards, 1873)
Carapace	Lateral border of carapace is moderately convergent	Lateral border of carapace is moderately convergent	Lateral border of carapace is strongly convergent	Lateral border of carapace is almost straight	Lateral border of carapace is moderately convergent	Lateral border of carapace is moderately convergent	Lateral border of carapace is strongly convergent
Carapace coloration	White with dark brown blotches all over carapace	Black with white color blotches all over carapace	Black with blue blotches all over carapace	Light blue	Black with few white blotches	Dark brown with white color blotches all over carapace	White with dark brown blotches on anterior half, posterior half dark brown
Major cheliped	Palm of the major chela is not having supramarginal groove adjacent to lower border in outer surface	Palm of the major chela is having supramarginal groove adjacent to lower border in outer surface	Palm of the major chela is not having supramarginal groove adjacent to lower border in outer surface	Palm of the major chela is not having supramarginal groove adjacent to lower border in outer surface	Palm of the major chela is having supramarginal groove adjacent to lower border in outer surface	Palm of the major chela is not having supramarginal groove adjacent to lower border in outer surface	Palm of the major chela is not having supramarginal groove adjacent to lower border in outer surface

\*Reference Naderloo *et al.*, 2010; Shih *et al.*, 2016; Naderloo, 2017

of *A. annulipes* by Pretzmen (1971) on the basis of material collected from Iran. Pretzmen (1971) distinguished both sub species on the basis of major chela morphology. According to Naderloo *et al.* (2010), the major chela morphology of both the species is almost similar but both species vary in case of shape of anterolateral border, morphology of male G1 and structure of median tooth of gastric mill.

Total 6 species of *Austruca* are reported from India and present study adds one more species, *Austruca iranica* in the list. The morphological comparison of these species is given in Table 2. The present study reports occurrence of two brachyuran crab species from Indian water. Indian coastline comprises of vast mangrove and mudflat habitats where species belonging to genus *Austruca* Bott, 1973 and *Parasesarma* De Man, 1895 occur in high abundance. Still very less species diversity is recorded under both genera and more exploration and studies are required on the taxonomy of particular genera.

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