

An annotated checklist of marine brachyuran crabs of Gujarat waters, India

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An annotated checklist of marine brachyuran crabs from Gujarat waters is prepared based on past and recent literature. In total, 152 species from 87 genera and 29 families of brachyuran crabs including four new records and two revisions are listed. Gulf of Kutch comprises higher species diversity in comparison to Saurashtra coastline and Gulf of Khambhat. *Dorippe quadridens* (Fabricius, 1793), *Lyphira perplexa* Galil, 2009, *Levindromia unidentata* (Rüppell, 1830) were reported for the first time from Gujarat whereas *Planes major* (MacLeay, 1838) was from Gujarat and India. *Matuta victor* (Fabricius, 1781) and *Portunus segnis* (Forskål, 1775) formerly misidentified in Gujarat waters are revised. Taxonomic description, habitat and distribution status of these species are presented.

Key words: *Annotated checklist, brachyuran crabs, distribution, Gujarat waters, new records.*

INTRODUCTION

Marine brachyuran crabs are characterized by having a depressed carapace or cephalothorax, the abdomen tucked under the rest of the body enclosed in the carapace, and cephalothorax with five pairs of walking legs. They are cosmopolitan in distribution from deep-water to intertidal zones and coral reef. Ng *et al.* (2008) contributed the world checklist of 6,793 species belonging to 1,271 genera in 93 families.

Fabricius (1775, 1793) was first to report the marine brachyuran crabs from India. Afterwards, many authors e.g. H. Milne Edwards (1852), Alcock & Anderson (1894, 1899), Alcock (1895–1900), Nobili (1903), (Kemp, 1915, 1917, 1919a, b), Chopra & Das (1930), Chopra (1933, 1934), Tikader (1965), Pillai (1951), Chhapgar (1957a, b), Chhapgar (1955, 1958a, b; 1961, 1969), Sekharan *et al.*, (1962), Pillai (1964), Sankarankutty & Rangarajan (1967); Chandy (1969, 1970); Gopalkrishnan (1970), Antony & Kuttyamma (1971), Griffin (1974), Sankarankutty (1969, 1975), Suseelan (1972), Ummerkutty & Deb (1972), Rao & Kathirvel (1972), Kathirvel & Gopalakrishnan (1974); Sankolli & Shenoy (1975), Selvaraj & Kathirvel (1980), Parulekar (1981), Radhakrishnan & Samuel (1982), Chhapgar & Borgaonkar (1985); Aravindakshan & Karbhari (1985); Chhapgar & Mundkur (1995), Saravanakumar & Thivakaran (2000), Jeyabaskaran *et al.* (2000), Chhapgar *et al.* (2004), Dineshbabu (2005), Ghosh (2004), Dev Roy & Nandi (2005), Radhakrishnan *et al.* (2006), Dev Roy & Bhadra (2008), Dev Roy (2008), Dev Roy & Nandi (2008) described and listed the marine brachyuran crabs from Indian coastline. Dev Roy (2013) compiled a checklist of 226 species belonging to 130 genera in 39 families of marine brachyuran crabs from five maritime states of west coast of India. Subsequently, Kumar *et al.* (2013), Ng & Kumar (2015a, b; 2016), Mohanty *et al.*

(2016), Barathkumar *et al.*, (2016) and Devi & Kumar (2017) reported new species and new records of brachyuran crabs from the Indian coast.

Many authors described the marine brachyuran crabs from Gujarat coastal areas (e.g. Hornell & Southwell, 1909; Chhapgar, 1957a, b, 1961, 1958b; Chandy, 1970; Dev Roy & Das, 2000; Jeyabaskaran *et al.*, 2002; Ghosh, 2004; Chhapgar *et al.*, 2004; Saravanakumar *et al.*, 2007; Rao & Rath, 2013; Pandya & Vachhrajani, 2013; Trivedi & Vachhrajani, 2013a, b; 2015; 2016a, b, Trivedi *et al.*, 2014; 2015a, b, 2016, 2017, 2018b, c; Gadhvi, 2015; Trivedi, 2015; Ng *et al.*, 2015; Belem *et al.*, 2016a, b, 2017; Gosavi *et al.*, 2017; Dash *et al.*, 2017). However, few authors e.g. Subba-Rao & Sastry (2005); Trivedi *et al.* (2012); Shukla *et al.* (2013); Dev Roy (2013); Belem *et al.* (2014) and Trivedi *et al.* (2015c, 2018a) listed the brachyuran crabs based on previous records from Gujarat coast.

Present study aimed to prepare an annotated checklist of marine brachyuran crabs from Gujarat waters based on the past and recent published literature.

MATERIAL AND METHODS

Gujarat is located in western part of India where the Arabian Sea borders the state to both the west and the southwest. It bestowed with the longest coastline of about 1600 km in India. It is divided into three marine regions namely Gulf of Khambhat, Saurashtra coast and Gulf of Kutch based on habitat and geographic locations. The Gulf of Khambhat is an inlet of the Arabian Sea along the southern coast of Gujarat with diverse mud flats and patchy mangrove regime and sparsely sandy-rocky habitat. The Gulf of Kutch is a semi-enclosed coastal area with diverse coral reefs and mangrove ecosystem. In the Gulf, intertidal zone is rocky-muddy with sandy supra-tidal zone, muddy-rocky middle intertidal zone with boulders, and lower zone with diverse coral reef zone. Saurashtra coastline shows a distinctive feature that is quite different from that of the Gulf of Kutch. The intertidal zone of Saurashtra coastline is unique in that the upper intertidal zone is rocky, somewhere sandy with mud, the middle intertidal zone is mostly rocky with crevices, and the lower intertidal zone is mainly rocky with sparse sand. Tide pools are common in the middle intertidal zone. Seven species were collected from intertidal zone, harbors and ports by hand picking method. Collected specimens mostly preserved in 10% buffered formalin solution and few in 95% alcohol. Collected voucher specimens deposited in the Museum of the Department of Life Sciences, Maharaja Krishnakumarsinhji Bhavnagar University, Bhavnagar, under the registration LSAIAB. Taxonomic identification was done through the scientific literatures such as Alcock (1895); Chace (1951); Wagner (1986); Holthuis & Manning (1990); Galil & Clark (1994); Guinot & Tavares (2003); Galil (2009); Lai *et al.*, (2010) and personal communication with experts. Diagnostic characters, habitat and distribution of each species are given. The size of specimens mentioned in the text pertains to carapace length (CL) and carapace width (CW) in mm. Stereo-Zoom Microscopes (Carl Zeiss Primo Star and Carl Zeiss Stemi 305 EDU) were used to measure the morphometric characters of pereopods and gonopods. Synonymy of the seven species treated in this study follows that of Ng *et al.*, (2008). The present checklist was prepared and compiled based on the previous published contributions and the present records of marine brachyuran crabs from Gujarat waters (Table 1).

RESULTS

Checklist of 152 species in 87 genera and 29 families of marine brachyuran crabs including four new records and two revisions with their distribution status in Gujarat waters is given in Table 1. Gulf of Kutch comprises the maximum species diversity (114 species, 76 genera, 28 families) due to its rich coral diversity and dense mangrove ecosystem. Saurashtra coast includes 43 species, 33 genera, 17 families that can be due to its rocky and sandy coast, while Gulf of Khambhat showed lowest species diversity (32 species, 20 genera, 10 families) because of its muddiest coastal characteristics.

Family of Portunidae demonstrated the highest species diversity (23 species, 7 genera) followed by Xanthidae (17 species, 10 genera), Pilumnidae (13 species, 7 genera), Ocypodidae (13 species, 4 genera), Leucosiidae (9 species, 7 genera), Macrophthalmidae (8 species, 3 genera), Sesarmidae (8 species, 6 genera) Epialtidae (7 species, 4 genera), Dotillidae (7 species, 3 genera), Grapsidae (5 species, 3 genera), Dromiidae (4 species, 4 genera), Majidae (4 species, 3 genera), Galenidae (3 species, 3 genera), Hymenosomatidae (2 species, 1 genera), Camptandriidae (3 species, 3 genera), Matutidae (3 species, 2 genera), Calappidae (2 species, 1 genera), Eriphiidae (2 species, 1 genera), Euryplacidae (2 species, 1 genera), Plagusiidae (2 species, 1 genera) and Dorippidae, Inachidae, Iphiculidae, Oziidae, Pinnotheridae and Pseudoziidae each with a single species in Gujarat waters.

Few species e.g., *Metopograpsus messor* (Forskål, 1775), *Ocypode ceratophthalmus* (Pallas, 1772), *Scylla serrata* (Forskål, 1775) were common among the three regions of Gujarat waters.

Seven species belonging to seven genera in seven families described here with their habitat and distribution. *Dorippe quadridens* (Fabricius, 1793), *Doclea muricata* (Fabricius, 1787) and *Lyphira perplexa* Galil, 2009 were distributed in deep sea thus these species were collected from harbors and ports of Gujarat, India, while *Matuta victor* (Fabricius, 1781), *Lewindromia unidentata* (Rüppell, 1830), *Planes major* (MacLeay, 1838) and *Portunus segnis* (Forskål, 1775) were collected from intertidal zone of Gujarat regions.

Two misidentified species in Gujarat waters namely *Portunus pelagicus* (Linnaeus, 1758) and *Asbtoret lunaris* (Forskål, 1775) identified as *Portunus segnis* (Forskål, 1775) and *Matuta victor* (Fabricius, 1781), respectively (Lai *et al.* 2010, Galil & Clark 1994), are also revised here. Recently, *Doclea muricata* (Fabricius, 1787) listed by Trivedi *et al.* (2018a) which is described here for the first time from Gujarat.

TABLE 1. Annotated checklist of Brachyuran crabs of Gujarat waters.

No	Scientific name	Distribution	References
Family Calappidae De Haan, 1833			
1	<i>Calappa exanthematos</i> Alcock & Anderson, 1894	Gulf of Kutch, Gujarat	Trivedi <i>et al.</i> , 2018a
2	<i>Calappa guerini</i> Brito-Capello, 1871	Okha, Gulf of Kutch	Chandy, 1970; Dev Roy & Nandi, 2005a; Subba Rao & Sastry, 2005; Dev Roy, 2013
Family Camptandriidae Stimpson, 1858			
3	<i>Opusia indica</i> (Alcock, 1900)	Lakhpat, Gulf of Kachchh, India, Gujarat,	Trivedi <i>et al.</i> , 2017
4	<i>Nasima dotilliformis</i> (Alcock, 1900)	Jakhau, Gulf of Kachchh, Gujarat,	Trivedi <i>et al.</i> , 2017
5	<i>Leptochryseus kuwaitense</i> (D. A. Jones & Clayton, 1983)	Lakhpat, Gulf of Kachchh, Gujarat	Trivedi <i>et al.</i> , 2017
Family Dotillidae Stimpson, 1858			
6	<i>Dotilla blanfordi</i> Alcock, 1900	Mahi estuary mouth, Gujarat	Pandya & Vachhrajani, 2013
7	<i>Dotilla myctiroides</i> (H. Milne Edwards, 1852)	Gulf of Kutch, Gulf of Khambhat	Saravanakumar <i>et al.</i> , 2007; Dev Roy, 2013
8	<i>Ilyoplax frater</i> (Kemp, 1919)	Gujarat	Trivedi <i>et al.</i> , 2018a

9	<i>Ilyoplax sayajiraoi</i> Trivedi, Soni, Trivedi & Vachhrajani, 2015	Kamboi, Gulf of Khambhat	Trivedi <i>et al.</i> , 2015a; Gadhvi, 2015
10	<i>Ilyoplax stevensi</i> (Kemp, 1919)	Gujarat	Trivedi <i>et al.</i> , 2018a
11	<i>Scopimera crabricauda</i> Alcock, 1900	Gujarat	Trivedi & Vachhrajani, 2018
12	<i>Scopimera proxima</i> Kemp, 1919	Gujarat	Trivedi <i>et al.</i> , 2018a
Family Dorippidae MacLeay, 1838			
13	<i>Dorippe quadridens</i> (Fabricius, 1793)	Okha port, Gujarat	Described in present record
Family Dromiidae De Haan, 1833			
14	<i>Ascidiophilus caphyraeformis</i> Richters, 1880	Okha, Gulf of Kutch	Chhapgar, 1957; Jeyabaskaran <i>et al.</i> , 2002; Subba Rao & Sastry, 2005; Dev Roy, 2013
15	<i>Conchoecetes artificiosus</i> (Fabricius, 1798)	Sutrapada coast	Trivedi, 2015
16	<i>Tumidodromia dormia</i> (Linnaeus, 1763)	Sutrapada coast	Trivedi, 2015
17	<i>Lewindromia unidentata</i> (Rüppell, 1830)	Sikka coast, Gujarat	Described in present record
Family Epialtidae MacLeay, 1838			
18	<i>Acanthonyx inglei</i> Tirmizi & Kazmi, 1988	Veraval landing centre, Gujarat, India	Trivedi <i>et al.</i> , 2018b
19	<i>Acanthonyx limbatus</i> A. Milne Edwards, 1862	Okha port, Gujarat	Chhapgar, 1961; Roy, 2013
20	<i>Doclea muricata</i> (Fabricius, 1787)	Salaya fishing harbor, Gulf of Kutch, Gujarat	Described in present record (Trivedi <i>et al.</i> , 2018a, listed only)
21	<i>Doclea rissoni</i> Leach, 1815	Pirotan Island	Chandy, 1970; Jeyabaskaran <i>et al.</i> , 2002; Dev Roy, 2013
22	<i>Hyastenus planasius</i> (Adams & White, 1848)	Okha	Chhapgar, 1957; Dev Roy, 2013
23	<i>Menaethius monoceros</i> (Latreille, 1825)	Okha, Gulf of Kutch	Chhapgar, 1957; Subba Rao & Sastry, 2005; Roy, 2013
Family Eriphiidae MacLeay, 1838			
24	<i>Eriphia sebana</i> Shaw & Nodder, 1803	Gujarat	Gopalakrishnan, 1970
25	<i>Eriphia smithi</i> MacLeay, 1838	Okha, Gulf of Kutch, Sutrapada, Dhamlej and Kodinar	Chhapgar, 1957; Thomas, 1969; Gopalakrishnan, 1970; Jeyabaskaran <i>et al.</i> , 2002; Subba Rao & Sastry, 2005; Dev Roy, 2013; Trivedi, 2015
Family Euryplacidae Stimpson, 1871			
26	<i>Eurate crenata</i> (De Haan, 1835)	Gulf of Kutch	Chandy, 1970; Dev Roy, 2013
27	<i>Eurate indica</i> Castro & Ng, 2010	Gujarat	Trivedi <i>et al.</i> , 2018
Family Galenidae Alcock, 1898			

28	<i>Dentoxanthus iranicus</i> Stephensen, 1946	Jakhau harbour, Gulf of Kachchh, fishing	Ng <i>et al.</i> , 2015
29	<i>Galene bispinosa</i> (Herbst, 1783)	Karumbhar (Kalubhar Island, Gulf of Kutch)	Chandy, 1970; Dev Roy, 2013
30	<i>Halimede tyche</i> (Herbst, 1801)	Gujarat	Trivedi <i>et al.</i> , 2018a
Family Grapsidae MacLeay, 1838			
31	<i>Grapsus albolineatus</i> Latreille, in Milbert, 1812	Okha, Chorwad, Veraval, Sutrapada, and Kodinar	Chhapgar, 1957b; Dev Roy & Das, 2000; Ghosh, 2004; Trivedi <i>et al.</i> , 2012; Dev Roy, 2013; Beleem <i>et al.</i> , 2014; Trivedi, 2015
32	<i>Metopograpsus latifrons</i> (White, 1847)	Kolak (Koliyak) and Umarsadi	Chhapgar, 1957b
33	<i>Metopograpsus messor</i> (Forskål, 1775)	Gulf of Kutch, Okha, Jamnagar, Sikka, Diu port Umarsadi, Kamboi, Gulf of Khambhat	Chhapgar, 1957b; Ghosh, 2004; Saravanakumar <i>et al.</i> , 2007; Trivedi <i>et al.</i> , 2012; Dev Roy, 2013; Beleem <i>et al.</i> , 2014; Gadhvi, 2015
34	<i>Metopograpsus thukubar</i> (Owen, 1839)	Diu, India	Trivedi <i>et al.</i> , 2018a (listed only)
35	<i>Planes major</i> (MacLeay, 1838)	Dhamlej coast, Gujarat	Described in present record
Family Hymenosomatidae MacLeay, 1838			
36	<i>Elamena cristatipes</i> Gravely, 1927	Okha	Chhapgar, 1957a; Subba Rao & Sastry, 2005
37	<i>Elamena sindensis</i> Alcock, 1900	Okha	Chhapgar, 1958b; Dev Roy, 2013
Family Inachidae MacLeay, 1838			
38	<i>Camposcia retusa</i> (Latreille, 1829)	Sikka coast, Gujarat	Beleem <i>et al.</i> , 2017
39	<i>Encephaloides armstrongi</i> Wood-Mason in Wood-Mason & Alcock, 1891	Veraval, Gujarat	Dash <i>et al.</i> , 2017
Family Iphiculidae Alcock, 1896			
40	<i>Pariphiculus mariannae</i> (Herklots, 1852)	Pirotan Island, Gulf of Kutch	Chandy, 1970; Jayabaskaran <i>et al.</i> , 2002; Dev Roy, 2013
Family Leucosiidae Samouelle, 1819			
41	<i>Arcania heptacantha</i> (De Man, 1907)	Nava Bandar, Diu	Beleem <i>et al.</i> , 2016a
42	<i>Arcania septemspinosa</i> (Fabricius, 1793)	Gulf of Kutch	Chhapgar, 1957, Subba Rao & Sastry, 2005; Dev Roy, 2013
43	<i>Leucisca squalina</i> MacLeay, 1838	Veraval	Beleem <i>et al.</i> , 2017; Gosavi <i>et al.</i> 2017
44	<i>Leucosia sima</i> Alcock, 1896	Okha, Diu	Chhapgar, 1957; Subba Rao & Sastry, 2005; Dev Roy, 2013; Present study

45	<i>Lypbira georgei</i> Trivedi, Soni & Vachhrajani 2016	Jakhau fishing port Veraval fishing port	Trivedi <i>et al.</i> , 2016
46	<i>Lypbira perplexa</i> Galil, 2009	Veraval port, Gujarat	Described in present record
47	<i>Philyra globus</i> (Fabricius, 1775)	Gujarat	Trivedi <i>et al.</i> , 2018a
48	<i>Ryphila cancellus</i> (Herbst, 1783)	Diu, India	Beleem <i>et al.</i> , 2017
49	<i>Seulocia pulchra</i> (Shen & Chen, 1978)	Jakhau fishing harbor	Trivedi & Vachhrajani, 2016a
Family Macrophthalmidae Dana, 1851			
50	<i>Chaenostoma sinuspersici</i> (Naderloo & Türkay, 2011)	Shivrajpur, Gujarat, India	Trivedi & Vachhrajani, 2017
51	<i>Macrophthalmus (Macrophthalmus) brevis</i> (Herbst, 1804)	Mahi estuary mouth, Gujarat	Pandya & Vachhrajani, 2013
52	<i>Macrophthalmus (Macrophthalmus) sulcatus</i> H. Milne Edwards, 1852	Umarsadi, Kamboi Gulf of Khambhat	Chhapgar, 1957b; Gadhvi (2015)
53	<i>Macrophthalmus (Mareotis) crinitus</i> Rathbun, 1913	Okha	Chhapgar, 1957b; Dev Roy, 2013
54	<i>Macrophthalmus (Mareotis) depressus</i> Rüppell, 1830	Kolak (Koliyak, Gulf of Khambhat), Gulf of Kutch	Chhapgar, 1957b; Saravanakumar <i>et al.</i> , 2007
55	<i>Macrophthalmus (Mareotis) pacificus</i> Dana, 1851	Okha	Chhapgar, 1957b; Roy, 2013
56	<i>Macrophthalmus (Mareotis) laevis</i> A. Milne-Edwards, 1867	Gopnath	Trivedi <i>et al.</i> , 2014
57	<i>Venitus dentipes</i> (Lucas, in Guérin-Méneville, 1838)	Kolak and Umarsadi	Chhapgar, 1957; Trivedi <i>et al.</i> , 2012; Beleem <i>et al.</i> , 2014
Family Majidae Samouelle, 1819			
58	<i>Micippa philyra</i> (Herbst, 1803)	Sikka, Narara and Dwarka	Beleem <i>et al.</i> , 2016b
59	<i>Micippa thalia</i> (Herbst, 1803)	Sikka, Narara and Dwarka	Beleem <i>et al.</i> , 2016b
60	<i>Prismatopus aculeatus</i> (H. Milne Edwards, 1834)	Gulf of Kutch	Chhapgar, 1957; Subba Rao & Sastry, 2005; Dev Roy, 2013
61	<i>Schizophrys aspera</i> (H. Milne Edwards, 1834)	Karumbhar Island (Kalubhar Island, Gulf of Kutch); Sutrapada coast and Gulf of Kutch	Chandy, 1970; Dev Roy, 2013; Beleem <i>et al.</i> , 2014; Trivedi, 2015
Family Matutidae De Haan, 1835			
62	<i>Ashtoret miersi</i> (Henderson, 1887)	Gulf of Kutch	Dev Roy, 2013
63	<i>Matuta planipes</i> Fabricius, 1798	Pirotan island, Sutrapada coast, Gujarat	Chandy, 1970; Subba Rao & Sastry, 2005; Dev Roy, 2013; Trivedi, 2015

64	<i>Matuta victor</i> (Fabricius, 1781)	Okha, Diu, Umarsadi, Kamboi Gulf of Khmabhat	Chhapgar, 1957; Chandy, 1970; Dev Roy & Das, 2000; Jeyabaskaran <i>et al.</i> , 2002; Subba Rao & Sastry, 2005; Roy, 2013; Gadhvi, 2015, Revised in present study
Family Menippidae Ortmann, 1893			
65	<i>Menippe rumbii</i> (Fabricius, 1798)	Sutrapada, Dhamlej and Kodinar coast	Trivedi <i>et al.</i> , 2012; Beleem <i>et al.</i> , 2014; Trivedi, 2015
66	<i>Myomenippe hardwickii</i> (Gray, 1831)	Gulf of Kutch	Dev Roy, 2008; Trivedi & Vachhrajani, 2012
Family Ocypodidae Rafinesque, 1815			
67	<i>Austruca annulipes</i> (H. Milne Edwards, 1837)	Okha	Chhapgar, 1957a
68	<i>Austruca iranica</i> Pretzmann, 1971	Gulf of Kutch	Trivedi & Vachhrajani, 2018c
69	<i>Austruca lactea</i> (De Haan, 1835)	Kamboi, Gulf of Khambhat, Gulf of Kutch	Dev Roy, 2013; Roy & Das 2000; Trivedi <i>et al.</i> , 2012; Beleem <i>et al.</i> , 2014; Gadhvi, 2015
70	<i>Austruca sindensis</i> (Alcock, 1900)	Okha, Kolak (Koliyak) and Umarsadi, Gujarat	Chhapgar, 1957b; Dev Roy, 2013
71	<i>Gelasimus vocans</i> (Linnaeus, 1758)	Okha	Chhapgar, 1957a
72	<i>Ocypode brevicornis</i> H. Milne Edwards, 1837	Mandavi coast, Kutch	Chhapgar <i>et al.</i> , 2004; Dev Roy, 2013
73	<i>Ocypode ceratophthalmus</i> (Pallas, 1772)	Okha, Veraval, Sutrapada, Dhamlej, Kodinar, Kolak and Umarsadi coast	Chhapgar, 1957b; Trivedi <i>et al.</i> , 2012; Dev Roy, 2013; Trivedi, 2015
74	<i>Ocypode cordimana</i> Latreille, 1818	Umarsadi	Chhapgar, 1957b
75	<i>Ocypode macrocera</i> H. Milne Edwards, 1852	Gulf of Kutch	Saravanakumar <i>et al.</i> , 2007
76	<i>Ocypode rotundata</i> Miers, 1882	Okha, Gulf of Kutch	Chhapgar, 1957b; Alcock 1900b; Jeyabaskaran <i>et al.</i> , 2002; Dev Roy, 2013
77	<i>Tubuca acuta</i> (Stimpson, 1858)	Gulf of Kutch	Saravanakumar <i>et al.</i> , 2007
78	<i>Tubuca alcocki</i> Shih, Chan & Ng, 2018	Gujarat	Chandy, 1973; Trivedi <i>et al.</i> , 2015c
79	<i>Tubuca dussumieri</i> (H. Milne Edwards, 1852)	Kolak (Koliyak) and Umarsadi, Poshitra, Gulf of Kutch	Chhapgar, 1957b; Chandy, 1970; Dev Roy & Das, 2000; Trivedi <i>et al.</i> , 2012; Dev Roy, 2013
Family Oziidae Dana, 1851			
80	<i>Epixanthus frontalis</i> (H. Milne Edwards, 1834)	Okha and Sutrapada coast	Chhapgar, 1957a, b; Trivedi, 2015

Family Parthenopidae MacLeay, 1838			
81	<i>Cryptopodia angulata</i> H. Milne Edwards & Lucas, 1841	Sutrapada (Saurashtra region) and Gulf of Kutch	Chhapgar, 1957; Subba Rao & Sastry, 2005; Trivedi & Vachhrajani, 2013; Trivedi, 2015
82	<i>Cryptopodia echinosa</i> Chiong and Ng, 1998	Gulf of Kutch	Dev Roy, 2008; Dev Roy, 2013
83	<i>Enoplolambrus echinatus</i> (Herbst, 1790)	Gulf of Kutch	Beleem <i>et al.</i> , 2014
84	<i>Enoplolambrus pransor</i> (Herbst, 1796)	Udvada, Gulf of Khambhat	Chhapgar, 1957a
Family Pilumnidae Samouelle, 1819			
85	<i>Bentopanope indica</i> (De Man, 1887)	Gujarat	Trivedi <i>et al.</i> , 2018a
86	<i>Eurycarcinus orientalis</i> A. Milne-Edwards, 1867	Kamboi, Gulf of Khambhat	Gadhvi, 2015
87	<i>Glabropilumnus laevis</i> (Dana, 1852)	Gulf of Kutch	Jeyabaskaran <i>et al.</i> , 2002; Dev Roy, 2013
88	<i>Heteropanope glabra</i> Stimpson, 1858	Ghogha, Gopnath	Trivedi <i>et al.</i> , 2015
89	<i>Heteropanope laevis</i> (Dana, 1852)	Okha, Gulf of Kutch	Chhapgar, 1957a; Subba Rao & Sastry, 2005
90	<i>Heteropilumnus angustifrons</i> (Alcock, 1900)	Beytbalapur, Gulf of Kutch	Chandy, 1970; Dev Roy, 2013
91	<i>Heteropilumnus ciliatus</i> (Stimpson, 1858)	Gujarat	Trivedi <i>et al.</i> , 2018a
92	<i>Heteropilumnus setosus</i> (A. Milne Edwards, 1873)	Okha	Chhapgar, 1957a; Subba Rao & Sastry, 2005; Dev Roy, 2013
93	<i>Pilumnopus convexus</i> (Maccagno, 1936)	Kuda, Gujarat, India	Gosavi <i>et al.</i> , 2017
94	<i>Pilumnus kempfi</i> Deb, 1987	Port Okha, Dwaraka (Gujarat coast)	Deb, 1987; Dev Roy, 2008; Dev Roy, 2013
95	<i>Pilumnus longicornis</i> Hilgendorf, 1878	Okha, Gulf of Kutch, Sutrapada and Kodinar coast	Chhapgar, 1957a; Jeyabaskaran <i>et al.</i> , 2002; Subba Rao & Sastry, 2005; Dev Roy, 2013; Trivedi, 2015
96	<i>Pilumnus minutus</i> De Haan, 1835	Gujarat	Trivedi <i>et al.</i> , 2018a
97	<i>Pilumnus vespertilio</i> (Fabricius, 1793)	Okha, Veraval, Sutrapada, Dhamlej and Kodinar coast	Chhapgar, 1957a; Dev Roy & Das, 2000; Jeyabaskaran <i>et al.</i> , 2002; Subba Rao & Sastry, 2005; Trivedi <i>et al.</i> , 2012; Roy, 2013; Beleem <i>et al.</i> , 2014; Trivedi, 2015
Family Pinnotheridae De Haan, 1833			
98	<i>Arcotheres placunae</i> (Hornell and Southwell, 1909)	Beyt Islands, all in Gulf of Kutch	Hornell & Southwell, 1909; Schmitt <i>et al.</i> , 1973; Roy, 2013
Family Plagusidae Dana, 1851			

99	<i>Plagusia depressa</i> (Fabricius, 1775)	Gulf of Kutch	Chhapgar, 1957b; Chhapgar <i>et al.</i> , 2004)
100	<i>Plagusia squamosa</i> (Herbst, 1790)	Sutrapada and Kodinar coast	Dev Roy, 2013; Chhapgar, 1957b; Trivedi, 2015
Family Portunidae Rafinesque, 1815			
101	<i>Charybdis (Charybdis) affinis</i> Dana, 1852	Gujarat	Trivedi <i>et al.</i> , 2018a
102	<i>Charybdis (Charybdis) annulata</i> (Fabricius, 1798)	Hanumandani, Okha reef, Veraval, Sutrapada, Dhamlej and Kodinar	Chandy, 1970; Dev Roy, 2013; Trivedi, 2015
103	<i>Charybdis (Charybdis) callianassa</i> (Herbst, 1804)	Pirotan island	Chandy, 1970; Dev Roy, 2013; Rao & Rath, 2013
104	<i>Charybdis (Charybdis) feriata</i> (Linnaeus, 1758)	Gulf of Kutch, Sutrapada, Dhamlej	Chhapgar, 1957a; Trivedi <i>et al.</i> , 2012; Dev Roy, 2013; Rao & Rath, 2013; Trivedi, 2015
105	<i>Charybdis (Charybdis) lucifera</i> (Fabricius, 1798)	Sutrapada coast, Gujarat	Trivedi, 2015
106	<i>Charybdis (Charybdis) miles</i> (De Haan, 1835)	Gujarat	Trivedi <i>et al.</i> , 2018a
107	<i>Charybdis (Charybdis) natator</i> (Herbst, 1804)	Okha	Chandy, 1970; Dev Roy, 2013
108	<i>Charybdis (Charybdis) orientalis</i> Dana, 1852	Dona reef, Gulf of Kutch	Chandy, 1970; Dev Roy & Das, 2000; Roy, 2013
109	<i>Charybdis (Goniobellenus) hoplites</i> (Wood-Mason, 1877)	Gulf of Kutch	Chhapgar, 1957a; Dev Roy, 2013
110	<i>Charybdis (Goniobellenus) smithii</i> MacLeay, 1838	Gujarat	Trivedi <i>et al.</i> , 2018a
111	<i>Charybdis (Goniobellenus) vadorum</i> Alcock, 1899	Gujarat	Trivedi <i>et al.</i> , 2018a
112	<i>Monomia petrea</i> (Alcock, 1899)	Gujarat	Dev Roy & Nandi, 2005a
113	<i>Podophthalmus vigil</i> (Fabricius, 1798)	Gujarat	Trivedi <i>et al.</i> , 2018a
114	<i>Portunus sanguinolentus</i> (Herbst, 1783)	Sutrapada and Dhamlej coast	Subba Rao & Sastry, 2005; Dev Roy, 2013; Trivedi, 2015
115	<i>Portunus segnis</i> (Forskål, 1775)	Diu, Kodinar, Veraval, Chorwad, Narara, Okha, Mangrol, Hanumandandi, Adatra reef, Okha, Gulf of Kutch	Chhapgar, 1957a; Chandy, 1970; Trivedi <i>et al.</i> , 2012; Dev Roy & Das, 2000; Subba Rao & Sastry, 2005; Roy, 2013; Rao & Rath, 2013; Beleem <i>et al.</i> , 2014; Trivedi, 2015; Revised in present study

116	<i>Scylla olivacea</i> (Herbst, 1796)	Sartanpur mud flats, Gulf of Khambhat; Hanumandandi, Gulf of Kutch	Chandy, 1970; Trivedi & Vachhrajani, 2013
117	<i>Scylla serrata</i> (Forskål, 1775)	Sutrapada, Kodinar, Sartanpar, Gopnath, Okha, Gulf of Kutch	Chhapagar, 1957a, Trivedi <i>et al.</i> 2012; Dev Roy, 2013; Trivedi & Vachhrajani, 2013; Rao & Rath, 2013; Beleem <i>et al.</i> , 2014; Trivedi, 2015
118	<i>Scylla tranquebarica</i> (Fabricius, 1798)	Sartanpur mud flats, Gopnath, Sutrapada	Trivedi & Vachhrajani, 2013; Trivedi, 2015
119	<i>Thalamita crenata</i> (Latreille, 1829)	Sutrapada and Dhamlej coast	Trivedi, 2015
120	<i>Thalamita poissonii</i> (Audouin, 1826)	Okha	Chandy, 1969; Dev Roy, 2013
121	<i>Thalamita prymna</i> (Herbst, 1803)	Okha, Gulf of Kutch	Chhapgar, 1957a; Subba Rao & Sastry, 2005; Beleem <i>et al.</i> , 2014
122	<i>Xipbonectes hastatooides</i> (Fabricius, 1798)	Gujarat	Trivedi <i>et al.</i> , 2018a
123	<i>Xipbonectes tenuipes</i> (De Haan, 1835)	Mandavi coast, Kutch	Chhapgar <i>et al.</i> , 2004; Dev Roy, 2013
Family Pseudoziidae Alcock, 1898			
124	<i>Pseudozius caystrus</i> (Adams & White, 1849)	Gujarat	Trivedi <i>et al.</i> , 2018a
Family Sesarmidae Dana, 1852			
125	<i>Episesarma mederi</i> (H. Milne Edwards, 1854)	Gulf of Kutch	Saravanakumar <i>et al.</i> , 2007; Dev Roy, 2008; Trivedi <i>et al.</i> , 2012
126	<i>Labuanium vitatum</i> Ng & Davie, 2011	Kolak (Koliyak, Gulf of Khambhat), Hanumandandi (Gulf of Kutch)	Chhapgar, 1957b; Chandy, 1970
127	<i>Nanosesarma jousseaumei</i> (Nobili, 1906)	Pirotan Island (Gulf of Kutch)	Ghosh, 2004; Dev Roy, 2013
128	<i>Nanosesarma minutum</i> (de Man, 1887)	Sangi, Kharo creek Gulf of Kutch	Saravanakumar, 2007; Dev Roy, 2013
129	<i>Neosarmatium smithi</i> (H. Milne Edwards, 1853)	Gulf of Kutch	Chhapgar, 1957b; Chandy, 1970
130	<i>Parasesarma persicum</i> Naderloo & Schubart, 2010	Gujarat	Trivedi & Vachhrajani, 2018c

131	<i>Parasesarma plicatum</i> (Latreille, 1803)	Okha reef, Diu port, Kolak (Koliyak), and Umarsadi, Kamboi Gulf of Khambhat	Chhapgar, 1957b; Chandy, 1970; Dev Roy & Das, 2000; Saravanakumar <i>et al.</i> , 2007; Trivedi <i>et al.</i> , 2012; Dev Roy, 2013; Rao & Rath, 2013; Gadhvi, 2015
132	<i>Selatium brockii</i> (de Man, 1887)	Gulf of Kutch	Saravanakumar <i>et al.</i> , 2007
Family Varunidae H. Milne Edwards, 1853			
133	<i>Metaplax indica</i> H. Milne Edwards, 1852	Nada, Gulf of Khambhat	Chhapgar, 1957b; Shukla <i>et al.</i> , 2013
134	<i>Ptychognathus barbatus</i> (A. Milne-Edwards, 1873)	Diu port	Ghosh, 2004; Dev Roy, 2013
135	<i>Varuna litterata</i> (Fabricius, 1798)	Kolak (Koliyak, Gulf of Khambhat)	Chhapgar, 1957b
Family Xanthidae MacLeay, 1838			
136	<i>Actaea calcuosa</i> A. Milne Edwards, 1869	Gulf of Kutch	Deb, 1989; Dev Roy, 2013
137	<i>Actaea savignii</i> (H. Milne Edwards, 1834)	Okha	Chhapgar, 1957; Subba Rao & Sastry, 2005; Dev Roy, 2013
138	<i>Atergatis integerrimus</i> (Lamarck, 1818)	Okha, Gulf of Kutch, Sutrapada, Dhamlej and Kodinar	Chhapgar, 1957; Roy & Das, 2000; Jeyabaskaran <i>et al.</i> , 2002; Subba Rao & Sastry, 2005; Trivedi <i>et al.</i> , 2012; Dev Roy, 2013; Beleem <i>et al.</i> , 2014; Trivedi, 2015
139	<i>Atergatis ocyroe</i> (Herbst, 1801)	Dwarka, Okha, Veraval, Dhamlej, Kodinar	Trivedi, 2015; Trivedi & Vachhrajani, 2016b
140	<i>Atergatis roseus</i> (Rüppell, 1830)	Okha, Gulf of Kutch, Veraval, Sutrapada	Chhapgar, 1957, 1979; Jeyabaskaran <i>et al.</i> , 2002; Subba Rao & Sastry, 2005; Dev Roy, 2013; Trivedi, 2015
141	<i>Atergatis subdentatus</i> (De Haan, 1835)	Gulf of Kutch	Trivedi <i>et al.</i> , 2012
142	<i>Chlorodiella nigra</i> (Forskål, 1775)	Gulf of Kutch	Beleem <i>et al.</i> , 2014
143	<i>Demania baccalipes</i> (Alcock, 1898)	Adatra reef; Sutrapada, Dhamlej and Kodinar coast,	Chandy, 1970; Trivedi, 2015; Dev Roy, 2013
144	<i>Etisus laevimanus</i> Randall, 1840	Okha; Veraval, Sutrapada, Dhamlej and Kodinar	Chhapgar, 1957; Subba Rao & Sastry, 2005; Dev Roy, 2013; Beleem <i>et al.</i> , 2014; Trivedi, 2015
145	<i>Euxanthus exsculptus</i> (Herbst, 1790)	Rozi coast (Jamnagar); Gulf of Kutch	Chhapgar & Mundkar, 1995; Jeyabaskaran <i>et al.</i> , 2002; Dev Roy, 2013; Beleem <i>et al.</i> , 2014
146	<i>Leptodius affinis</i> (DeHaan, 1835)	Sutrapada, Dhamlej and Kodinar, Okha	Trivedi & Vachhrajani, 2015; Trivedi, 2015

147	<i>Leptodius exaratus</i> (H. Milne Edwards, 1834)	Okha, Dhamlej, Gujarat coast	Chandy, 1970; Dev Roy & Das, 2000; Dev Roy, 2013; Trivedi, 2015
148	<i>Macromedaens crassimanus</i> (A. Milne Edwards, 1867)	Sutrapada and Kodinar coast	Trivedi, 2015
149	<i>Macromedaens quinquentatus</i> (Krauss, 1843)	Port Okha and Saurashtra coast, Gujarat	Chhapgar, 1958b; Jeyabaskaran <i>et al.</i> , 2002; Roy, 2013; Present study
150	<i>Medaeops granulosus</i> (Haswell, 1882)	Okha, Gulf of Kutch	Chhapgar, 1957; Subba Rao & Sastry, 2005; Dev Roy, 2013
151	<i>Medaeops neglectus</i> (Balss, 1922)	Gujarat	Trivedi <i>et al.</i> , 2018a
152	<i>Platypodia cristata</i> (A. Milne-Edwards, 1865)	Okha, Gulf of Kutch	Chhapgar, 1957; Dev Roy & Das, 2000; Jeyabaskaran <i>et al.</i> , 2002; Subba Rao & Sastry, 2005; Trivedi <i>et al.</i> , 2012; Roy, 2013; Beleem <i>et al.</i> , 2014

DISCUSSION

Family Dorippidae MacLeay, 1838

Genus *Dorippe* Weber, 1795

Dorippe quadridens (Fabricius, 1793) (Fig. 1a)

Cancer quadridens Fabricius, 1793:464 (type locality: Tranquebar, India). Holthuis, 1962:54, 55; Zimsen, 1964:649; Manning & Holthuis, 1981:30.

Dorippe atropos Lamarck, 1818:245 (type locality: "Ocean Indien").

Dorippe nodosa DeFrance, 1819:444 [nomen nudum]; A.G. Desmarest, 1822:120 [nomen nudum]; 1823:251 [in synonymy]; 1825:135 [in synonymy].

Dorippe rissoana DeFrance, 1819:444.

Material examined

1 male, CL= 31.4 mm; CW= 32.8 mm; 2 female (1) CL= 31.8 mm, CW= 33.9 mm, (2) CL= 28.7 mm CW= 29.3 mm. first pleopod length = 90 mm. trawl by-catch (Okha harbor: 22°29'58.25"N, 69° 3'26.28"E), Coll. by the first and second authors, January, 2017 LSAIAB14

Diagnosis

Carapace strongly sculptured, entirely scattered with setae. Protogastric tubercles crater-like, depressed in center. Inner protogastric tubercle, on ridge along anterior margin of branchial groove, low, inconspicuous; second protogastric tubercle distinct. Two well-developed lateral tubercles on cardiac area; a single tubercle on posterior region. Cardiac ridge Y-shaped. Lateral branchial tubercle distinct and sharp, ridge extending anteriorly from it carrying 10 to 12 small, sharp spinules, posterior dorso-branchial tubercle distinct, rounded or oval shaped, smooth. Anterior dorso-branchial tubercle irregular shaped, wider than long. Frontal teeth triangular shaped, separated by a deep V-shaped fissure. Inner margin of frontal teeth minutely tuberculate. Outer orbital tooth long, straight, reaching beyond front, inner dorsal margin with one to four granules basally. Anterolateral margin of carapace, between base of exorbital tooth and cervical groove, with three to nine sharp spinules. Lower margin of orbit with a row of four to seven spines on outer margin of inner suborbital tooth. Eyes slender retractile, cornea occupying less than half-length of eye. Chelipeds unequal in size and armature in male and nearly equal in size and armature in female; merus twice longer than carpus, lateral margin covered with feathery setae, outer surface covered with distinct

small sharp teeth, inner surface smooth; carpus with feathery setation on outer margin, outer surface with a row of distinct teeth; palm with granules basally at outer surface, inner surface smooth, longitudinal groove present on upper part of outer surface of palm.; finger smooth, cutting edge toothed.

Ambulatory legs sub-cylindrical, meri each covered with feathery tomentum, meri of second and third pereopod longer than carpus; carpus of second and third pereopods with single a row of granules on outer margin; propodus and dactylus of each pereopod unarmed, dactylus longer than propodus. Male, abdomen with three distinct triangular teeth on second somite, median broader than laterals. Teeth of third somite triangular with rounded tips; median much more rounded than laterals. Fourth somite with a single strong triangular median tooth. Female, abdomen with three teeth on both third and fourth somites, between these a row of granules usually present. Median tooth wider and more rounded than laterals. Fifth somite with straight, sharp transverse carina. The first male pleopod short and straight, ending in a single narrow bluntly rounded tip, lacking a basal lobe.

Habitat

Generally found in Deep Sea

Distribution

Australia (Desmarest, 1817, 1822; DeFrance, 1819), China seas, Philippines, Zanzibar, Sri Lanka, Tanzania, Java sea, Arafura Sea, Indonesia, Dampier Archipelago, Shark Bay Western Australia (White 1847, Milne Edwards, 1868, Miers, 1884, Henderson, 1893, De Man, 1896), Hong Kong (Stimpson, 1858, 1907; Gee 1925; Shen 1931, 1940) Mergui Archipelago (De Man, 1887-1888a; Alcock 1896), Penang, Malaysia (Lanchester, 1902), Obock, Perim Island Gulf of Aden (Nobili, 1906), Haddumati Atoll, Republic of the Maldives, Cargados Carajos (Borradaile, 1903; Rathbun, 1911), Gulf of Mannar (Laurie, 1906), South coast of Timor (Ihle, 1916), Indochine, Vietnam (Andre, 1931; Serene, 1937), Mitsio Islands, Ambaro Bay, Nosy Komba, Narendry Bay, Soalara, Madagascar (Chen, 1987), Tarut Bay to Safaniya, coast of Saudi Arabia and Arabia gulf (Alcock, 1896; Basson, *et al.*, 1977), Siglap, Singapore (Serene & Romimohtarto 1969; Yang, 1979), Fish Harbor of Karachi, Pakistan (Karim, 1973), Maputo bay Mozambique (Kensley, 1981; Barnard, 1950), Andaman Sea, Thailand, Gulf of Thailand (Naiyanetr, 1980), Trivandrum, Pudumadam. Gulf of Mannar, Krusadai Island, Rameswaram, Ganjam to Palk Strait, Tranquebar, Madras, Sandheads, mouth of Hooghly River, Andaman Islands, India (White, 1847; Pillai 1951; Sankarankutty, 1966; Gravely, 1927; Henderson, 1893; Alcock, 1896; Fabricius, 1793, 1798; Bosc, 1802; Latreille, 1802; Alcock and Anderson, 1894; Gravely, 1941; Chopra, 1933), Cape Liant, Tung Kaben, and Koh Kahdat, Gulf of Thailand (Suvatti, 1938, 1950), Indo-West Pacific region, Suez Canal, the Red Sea and southeastern Africa to Hong Kong, the Philippines, Indonesia, and Australia, southern China (Holthuis & Manning, 1990). Ashdod, Mediterranean Sea (Galil, 2005), Dampier Archipelago, Western Australia (Thoma, 2007), Arukattuthurai to Passipattinum, South coast India (Varadharajan & Soudarapandian, 2014) and Iran (Naderloo *et al.*, 2015). Presently, it is reported for the first time from Gujarat coast, India (Table 1).

Remarks

Diagnostic characters of the specimens examined agrees well with the detailed description of *D. quadridens* presented by Holthuis & Manning (1990).

Family Dromiidae De Haan, 1833

Genus *Lewindromia* Guinot & Tavares, 2003

Lewindromia unidentata (Rüppell, 1830) (Fig. 1b)

Dromia unidentata Rüppell, 1830: 16, pl. 4 fig. 2, 2a, pl. 5 fig. 9.

Dromidia unidentata hawaiiensis Edmondson 1922: 6, pl. II D, fig. 1a–j.
Cryptodromia unilobata Campbell & Stephenson, 1970: 240, fig. 2A–I.
Cryptodromia incisa Zarenkov, 1971: 169.
Cryptodromiopsis unidentata McLay 1993: 192, figs. 7a–k, 18a. McLay 1998: 347, McLay 2001a: 843, fig. 8.

Material examined

2 females (1) CL= 27.6 mm, CW= 27.8 mm; (2) CL= 26.3 mm, CW= 26.6 mm; Coll. by First author (Sikka coast, 22°28'3.76"N, 69°48'52.44"E) April, 2015, LSAIAB24

Diagnosis

Carapace as long as wide, evenly convex, entirely dense tomentum; dorsal surface with regions poorly defined; branchial groove marked. Anterolateral margin not joining exorbital angle, long, convex, entire, only with a very blunt tooth behind level of branchial groove; posterolateral margins not noticeably convergent posteriorly. Front narrow, with rostrum very small and blunt, not visible dorsally, two pseudorostral teeth; supraorbital, suborbital and exorbital teeth present. In females, sternites seventh and eighth tilted, almost perpendicular in relation to precedent ones. Female sternal sutures 7/8 posteriorly wide apart, sharply close to each other at level of third pereopod where they are marked by thick ridge; apertures of spermathecae ending together on slight prominence between second pereopod. Chelipeds identical in size and armature, unarmed, entirely tomentum; merus smooth, longer than carpus; wrist with two tubercles at the end of anterior border; dactylus with three or four indistinct teeth at inner margin. Pereiopods covered entirely with dense tomentum; meri, carpi and propodi of second and third pereopod unarmed; dactyli of second and third pereopods armed with five to six spines on inner margin; fourth pereopod longer than fifth; meri and carpi of fourth and fifth pereopod unarmed; propodi of fourth pereopod with one distal sharp spine and two opposing spines of dactyli; propodi of fifth pereopod with two small distal spines and two opposing spines of dactyli; dactyli of fourth and fifth pereopod curved, unarmed.

Habitat

L. unidentata is commonly found in lower intertidal zone of Kutch, generally in camouflage with sponges.

Distribution

Red Sea and East coast of Africa, Persian Gulf, Ceylon, Coromandel coast, Andaman Sea, Malay Archipelago (Alcock, 1901). Red Sea, East Africa, New Guinea, Hawaii and Japan (Garth, 1973), Waikiki reef, Honolulu, Hawaii (Edmondson, 1922), Widely distributed in Indo-Pacific: Visayas, Philippines, north of Panglao (McLay, 1993), Tonga, Philippine Islands (McLay, 2001), Indo-west central Pacific Oceans (Davie, 2002), Balicasag Island and Visayas, Philippines, Indian Ocean, Singapore, Japan, Philippines, Queensland, New Caledonia, Kermadec Islands, Tonga, Hawaii and as far east as Easter Island (McLay & Ng 2005), Okinawa Island, Japan (Komatsu & Takeda, 2009). Presently, it is reported for the first time from Gujarat, India (Table 1).

Remarks

Diagnostic characters of the specimens examined agrees well with the detailed description of *L. unidentata* presented by Guinot & Tavares (2003).

Family Epialtidae MacLeay, 1838

Genus *Doclea* Leach, 1815

Doclea muricata (Fabricius, 1787) (Fig. 1c)

Cancer muricata Herbst, 1790:211-212, pl. 14: fig. 84.

Doclea hybridoides Bleeker, 1856: 9; 1857: 9; Ortmann, 1893: 47.

Inachus hybridus Weber, 1795: 93 (nomen nudum); Fabricius, 1798: 335

Material examined

2 male (1) CL= 41.4 mm, CW= 37.5 mm, (2) CL= 32.4 mm CW= 31.9 mm, Coll. by First author, trawl by-catch (Salaya fishing harbor, Gulf of Kutch, 22°29'15.56"N, 69°35'11.95"E), February, 2017. LSAIAB15

Diagnosis

Carapace sub-globular, entirely covered with wooly tomentum; rostrum short, bifid, a pair of spines beneath the base of antenna, two teeth on outer angle of buccal margin, outer edge of the post orbital spine is a bit convex, almost straight, anterolateral margin of carapace armed with four sharp spines. Median line of the carapace with eight tubercles, first four on gastric region, fifth on eurogastric region, sixth on the cardiac region and seventh and eighth on the intestinal region. Proto-gastric margin with a longitudinal row of tubercles; margin of branchial region comprises four of tubercles. Margin of urogastric with one tubercle, margin of cardiac region with two tubercles. Meta-gastric region shows a small tubercle the anterior margin, hepatic region with one tubercle, on both the side of branchial region with two large spines, one behind the other. Pterygostomial canal absent. Chelipeds identical in size and armature, slender, smooth; merus longer than propodus; fingers with wide gap when closed. The ambulatory legs long and slender; second ambulatory leg longer, third, fourth and fifth decreasing gradually in length. Abdomen comprises seven plates; fourth thoracic somite with two strong submedian spines. The first male pleopod slightly bent, smooth and tapers gradually to a rather sharp point.

Habitat

Generally found in Deep Sea

Distribution

India (Alcock, 1895); Delagoa Bay, Cape Province, South Africa (Barnard, 1950); off Point Shepstone, Natal, South Africa (Stebbing, 1920; Barnard, 1950); Gulf of Martaban, Burma, Madras, Coromandel coast, India (Henderson, 1893); Pamban, Rameswaram, India (Thurston, 1895); Ratnagiri, Maharashtra, India (Sankolli & Shenoy, 1975); Bay of Bengal (Griffin 1974); Maharashtra and Coromandel Coasts, Gulf of Mannar, Lakshadweep, Andaman and Nicobar Islands (Jeyabaskaran *et al.*, 2002). Presently it is described for the first time from Gujarat, India (Table 1).

Remarks

Diagnostic characters of the specimens examined agrees well with the detailed description of *D. muricata* presented by Alcock (1895) and Wagner (1986).

Family Grapsidae MacLeay, 1838

Genus *Planes* Bowdich, 1825

Planes major (MacLeay, 1838) (Fig. 1d)

Nautilograpsus angustatus Stimpson, 1858; p. 103 (49).

Nautilograpsus major MacLeay, W.S. (1838). 4 pls (66).

Planes cyaneus Dana, J.D. (1851). 247-254 (250).

Varuna atlantica Melliss, J.C. 1875, p. 203. (49).

Material examined

1 female CL= 13.00 mm, CW= 12.8 mm, Coll. by First author, June, 2016, (Dhamlej coast, 20°46'35.90"N, 70°36'1.96"E) LSAIAB16

Diagnosis

Carapace as long as broad, entirely convex, smooth, front slightly depressed, margin lightly sinuated, lateral margin with a single rounded indentation near orbit but without acute teeth; branchial region lightly striated, cardiac groove marked. Chelipeds identical in size and armature, merus with four spiny teeth on anterolateral edge; carpus with one anterodistal spiny tooth; propodus unarmed; dactylus with denticulate ridge on inner margin. Ambulatory legs short, slender, and flattened; meri and carpi of second and fifth pereopod unarmed, smooth; meri of third and fourth pereopod with a spiny spine at posterior end; propodi of each pereopods covered with feathery setae on anterior region and posterior margin with double line of sharp small spine; dactyli of each pereopod with row of double line of spines at anterior and posterior margin.

Habitat

Found under the crevices of rocks from lower intertidal zone.

Distribution

North Pacific (Stimpson, 1907), Ogasawara Islands (Komatsu, 2011), Taiwan (Ng *et al.*, 2001), Cape of Good Hope (MacLeay, 1838; Ng & Ahyog, 2001), Australian coasts, Indo-Pacific and Atlantic Oceans (Davie, 2002). St. Helena (South Atlantic); Eastern pacific, Indian Ocean (Chace, 1966), Atlantic Ocean (Melliss, 1875), South California, Hawaii Islands, Mauritius, Pacific coast of Mexico, Gulf of California, North-west of Galapagos Island, Peru, South Africa (Chace, 1951), Southern Australia (Poore, 2004), Presently it is reported for the first time from India (Table 1).

Remarks

Diagnostic characters of the specimens examined agrees well with the detailed description of *P. major* presented by Chace (1951). It extends its range from South Africa to Arabian seas.

Family Leucosiidae Samouelle, 1819**Genus *Lyphira* Galil, 2009*****Lyphira perplexa* Galil, 2009 (Fig. 1e)**

Cancer globus Fabricius, 1775: 401 (p.p.).

Cancer anatum Herbst, 1783: 93, pl. 2, fig. 19 (p.p.).

Cancer globosus Fabricius, 1787: 315; 1793: 441 (p.p.).

Leucosia globosa Fabricius, 1798: 349 (p.p.).

Philyra globosa de Man 1888: 203 (p.p.).

Philyra globulosa Alcock 1896: 245; Chopra 1934: 38., Stephensen 1945: 77, figs 10, 11a-l.,

Tirmizi & Kazmi 1988: 98, fig. 28., Deb, 1998: 358.

Material examined

1 male CL= 29.9 mm, CW= 30.00 mm, trawl by-catch (Okha harbor: 22°29'58.25"N, 69°3'26.28"E), Coll. by the first and second authors, January, 2017 LSAIAB1

Diagnosis

Carapace sub-circular, bearing closely spaced granules, hepatic, branchial and intestinal regions possess slightly larger, perliform granules; intestinal region slightly tumescent, front slightly depressed, minutely granulate, anterolateral margin slightly sinuate, posterolateral margin arcuate. Circumference of carapace behind front irregularly beaded with granules of variable in sizes. Anterior margin of epistome medially notched. External maxillipeds minutely granulate. Pterygostomian region prominently granulate. Male abdominal segments 2-6 fused, bearing granulate basal knobs separated by concavity. Chelipeds identical in size and armature, merus shorter than

carapace length, entirely granulate, granules decreasing in size distally; Carpus with row of granules on inner margin; propodus with row of granules on upper, lower and inner surface; finger denticulated at inner margin, outer margin granulate, inner margin of pollex bearing triangular dentiform tubercle proximally. Male first pleopod with apical process flattened, squat, distally rounded.

Habitat

Generally found in Deep Sea

Distribution

East coast, mouth of the Hooghly to Point Travancore coast, the Andamans, and the Persian Gulf (Alcock, 1896), Pakistan (Tirmizi & Kazmi, 1988); West Bengal, Malabar coast, Andaman Island, Persian Gulf (Deb, 1988). Persian Gulf, Gulf of Oman, Pakistan, India, Anadaman Island (Galil, 2009). Presently it is reported for the first time from the Gujarat coast, India (Table 1).

Remarks

Species description and remarks of *L. perplexa* agrees well with the detailed description of the species (Galil, 2009). *L. perplexa* is distinguished from its congeners *L. georgei* by the shape and structure of first pleopod, e.g., In *L. georgei* the main shaft of pleopod has an angular turn medially, while almost straight in *L. perplexa*. The apical lobe of *L. perplexa* flattened in shape, squat, distally rounded whereas in *L. georgei* is scoop-shaped with a slightly pointed tip and medially notched (Trivedi *et al.*, 2016).

Family Matutidae De Haan, 1835

Genus *Matuta* Weber, 1795

Matuta victor (Fabricius, 1781) (Fig. 2a)

Cancer victor Fabricius, 1781: 502, 1793: 449.

Matuta peronii Leach, 1817: 13; pl. 127(1, 2).

Matuta lesueurii Leach, 1817:14.

Matuta victrix var. *crebrepunctata* Miers, 1877: 244, pl. 39.

Matuta lunaris, Chhappgar, 1957a: pl. 2, pp. 6-7.

Material examined

3 male, (1) CL= 37.7 mm, CW= 40.5 mm, (2) CL= 40.1 mm, CW= 42.3mm, (3) CL= 35.5mm, CW= 36mm; 2 female (1) CL= 29.4 mm, CW= 30.9mm (2) CL= 27.8mm, CW= 29.4mm, (Koliyak: (21°35'55.84"N, 72°17'9.29"E), Sartanpar (21°17'42.22"N, 72° 6'57.07"E), Okha (22°28'43.64"N, 69° 4'44.65"E) and Narara (22°28'11.32"N, 69°42'40.08"E) Coll. by First author LSAIAA20.

Diagnosis

Carapace subcircular, slightly convex, minutely granulate. Front slightly depressed, wider than orbit, trilobate, median lobe projecting, anteriorly emarginate. Anterolateral margin with ten to fourteen tubercles. Posterolateral margin obliquely carinate. Lateral spines strong massive. Pterygostomial region covered with setae, possess rows of elongate tubercles. Ischium of third maxilliped minutely granulate basally. Chelipeds subequal, in size and armature, massive; merus unarmed, longer than carpus; carpus with distinct teeth at anterodistal end; palm with three sharp teeth at anterior margin, dorsal surface with two rows of tubercles, Mid-palm with a rounded ridge extending to tip of lower finger, proximally with granulate tubercle followed by a prominent spine. At lower proximal angle of palm a prominent spine. Dactylus in male bearing distinctly milled ridge on outer surface, absent in female. Ambulatory legs natatory, meri each with a row of minute teeth on flexor margin; carpi each

with an anterodistal tooth; propodi each with a triangular tooth on flexor margin; dactyli of second, third and fourth pereopod pointed at distal end, dactyli of fifth pereopod rounded. First male pleopod distally setose, apex rounded, with funnel-shaped appendage on inner surface framed laterally by minute granules.

Habitat

M. victor commonly found in supratidal zone, or concealed in of sandy habitat of entire Gujarat coast; mostly found trapped in fishing nets.

Distribution

Bombay, Karwar, Okha, Umarsadi (Chhapgar, 1957a); Red Sea and East Africa to Fiji and New Caledonia (Galil and Clark, 1994); Gulf of Suez, Red Sea, Gulf of Oman, Arabian Sea, East Africa, Madagascar, Comoro Is, Bay of Bengal, Andaman Sea, Malaysia, Indonesia, South China Sea, Japan, New Caledonia, Australia, New Hebrides, Mediterranean Sea (Galil & Mendelson, 2013); Gulf of Kutch (Beleem *et al.*, 2014). Presently it is revised as *M. victor* (Table 1).

Remarks

Species description and remarks of *M. victor* agrees well with the detailed taxonomic description of the species (Galil & Clark, 1994). Formerly, it was identified as *Ashtoret lunaris* (Forskål, 1775) in Gujarat coast. Considering detailed morphology of the specimens especially its chelae and first pleopod structure, it is confirmed as *M. victor*. The species of the genus *Matuta* differ from *Ashtoret* by possessing unicarinate penultimate carpus, oblique mid palmar ridge and dactylar ridge strongly milled throughout, while the members of *Ashtoret* possess bicarinate penultimate carpus, mid palmar ridge parallel with lower margin, and dactylar ridge distally milled or smooth (Galil & Clark, 1994).

Family Portunidae Rafinesque, 1815

Genus *Portunus* Weber, 1795

Portunus segnis (Forskål, 1775) (Fig. 2b)

Cancer segnis Forskål, 1775: 18, 91.

Portunus mauritanus Ward, 1942: 79, Pl. 5 Fig. 5.

Neptunus (Neptunus) pelagicus, Chhapgar, 1957a, Pl.6 Fig. a.

Portunus pelagicus, Tirmizi & Kazmi, 1996, Fig. 7.

(For detailed synonymy, see Lai *et al.* 2010)

Material examined

6 male (1) CL= 43.7 mm, CW= 76.4 mm (2) CL= 48.2 mm, CW= 103.2mm (3) CL= 65.7mm, CW=13.3mm (4) CL= 50.8mm, CW= 102.9mm (5) CL=45.2mm, CW=97.5mm (6) CL=55.9mm, CW=115.5mm, Narara (22°28'35.93"N, 69°43'11.20"E), Okha (22°28'47.56"N, 69° 4'54.73"E), Chorwad (21° 0'7.82"N, 70°12'19.37"E), Veraval (20°54'16.25"N, 70°23'1.49"E), Kodinar fish market (20°47'48.91"N, 70°41'52.95"E), Vanakbara bandar, Diu, (20°42'21.77"N, 70°52'50.82"E); 2 female (1) CL= 55.3 mm , CW= 120 mm (2) CL= 56 mm, CW= 125.3 mm (Khodidhar beach, Diu (20°42'4.51"N, 70°54'36.49"E), Shil, Mangrol (21°9'54.98"N, 70°3'16.10"E) 1, 2, coll. by first author, LSAIAB22

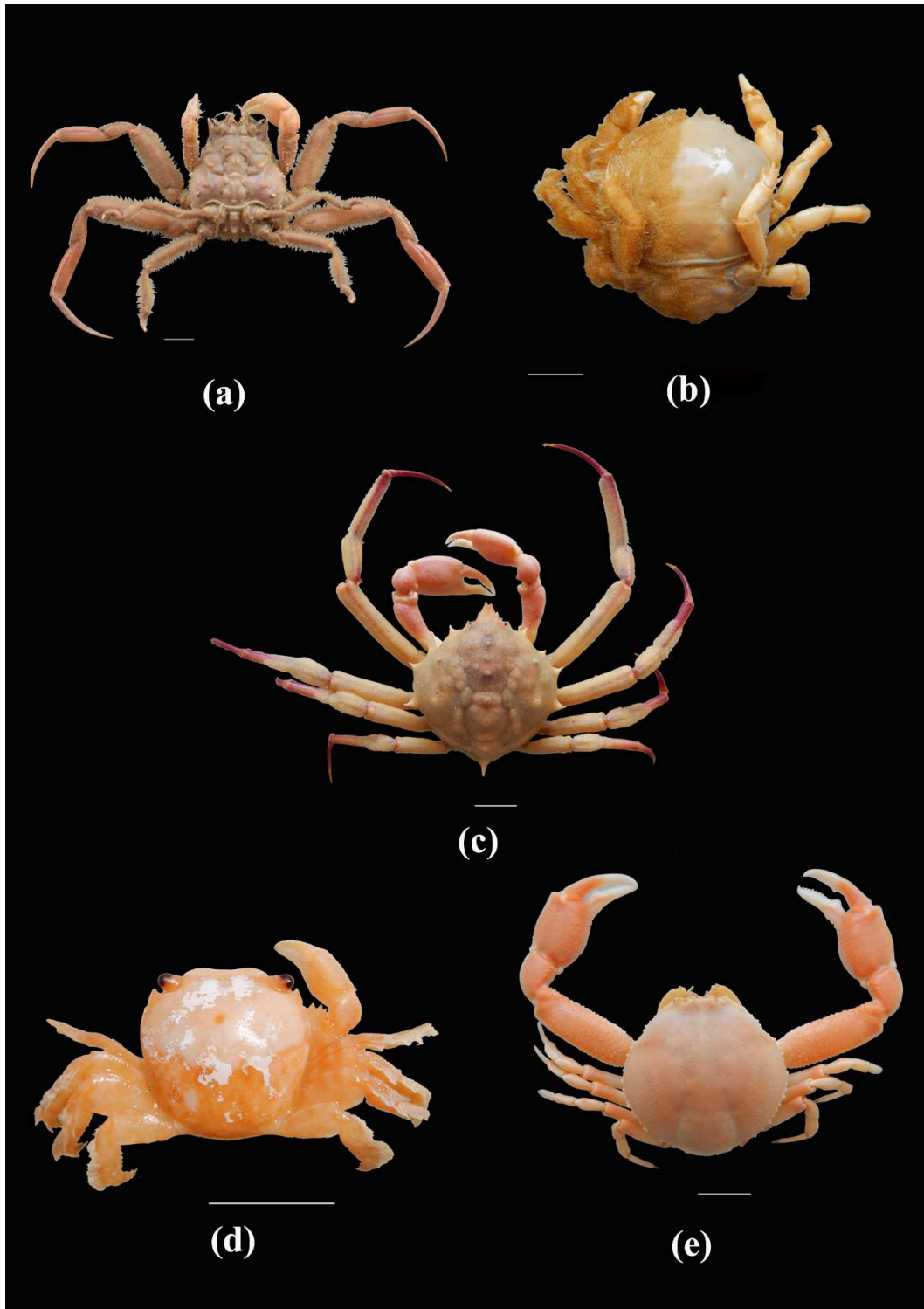


FIGURE 1. Entire animal dorsal view (a) *Dorippe quadridens* (Fabricius, 1793) male, CL: 31.4 mm; CW: 32.8 mm. (b) *Lewindromia unidentata* (Rüppell, 1830) Ovigerous female, CL: 27.6 mm, CW: 27.8 mm. (c) *Doclea muricata* (Fabricius, 1787) male, CL: 41.4 mm, CW: 37.5 mm. (d) *Planes major* (MacLeay, 1838) female CL: 13.00 mm, CW: 12.8 mm. (e) *Lyphira perplexa* Galil, 2009 male, CL: 29.9 mm, CW: 30.00 mm (Bar represent size = 1 cm)

Diagnosis

Carapace wider than long, entirely granulated, median frontal teeth minute or absent, usually inconspicuous. Branchial region convex, anterolateral margin with nine uneven sized teeth. Chelipeds equal in size and armature; meri as long as palm, meri with three sharply tipped broad spines on anterior margin, and with one sharp teeth on posterodistal end; carpi with one sharp tooth on anterodistal end and one sharp tooth on posterodistal end; palm comprised four perpendicular ridge, and two teeth on anterodistal end, tip of dactylus bent underside tip of immovable finger. Ambulatory legs slender, meri of second, third and fourth pereopods longer than broad; meri and carpi of fifth pereopods unarmed; carpi of second, third and fourth pereopods with a sharp tooth at anterodistal end; propodi and dactyli of second, third and fourth pereopods with feathery setae on extensor margin; dactyli oval shaped of fifth pereopod. First pleopod slender and slightly bent, have no bend near the tip, basal part covered with slight spur.

Habitat

This species is generally found in the middle and lower intertidal zone of the Gulf of Kutch while in Saurashtra coast, it is generally caught from ports and harbor, sometimes from sub-tidal region by net fishing.

Distribution.

Bombay, Karwar, Okha (Chhapgar, 1957a), Mediterranean Sea (Ekman, 1967; Ozcan *et al.*, 2005) Turkish coast of the Aegean Sea (Yokes *et al.*, 2007), Tyrrhenian Sea (Crocetta, 2006), Western Indian Ocean, from Pakistan westwards to the Arabian Gulf, and extending to the east coast of South Africa, Mozambique, Madagascar and Mauritius (Lai *et al.*, 2010), North and East coast of Qatar Western Arabian Gulf (Giraldes *et al.*, 2016) Gulf of Kutch (Trivedi *et al.*, 2012; Beleem *et al.*, 2014). Presently it is revised as *P. segnis* (Table 1).

Remarks

Species description and remarks of *P. segnis* agrees well with the detailed taxonomic description of the species (Lai *et al.*, 2010). Formerly, it was identified as *P. pelagicus* by various authors of Gujarat coast. *P. segnis* differs from *P. pelagicus* by having the less prominently swollen branchial region while in *P. pelagicus* prominently swollen branchial region. Lai *et al.* (2010) revised the *P. pelagicus* species complex and recognized four individual species: *P. pelagicus* (Linnaeus, 1758), *P. segnis* (Forskål, 1775), *P. reticulatus* (Herbst, 1799) and *P. armatus* (A. Milne-Edwards, 1861). The authors identified the species in the western Indian Ocean and Pakistan as *P. segnis* that was based on morphological and molecular analyses (Lai *et al.*, 2010). We reexamined all the specimens from Gujarat coast, and confirmed it as *P. segnis*.

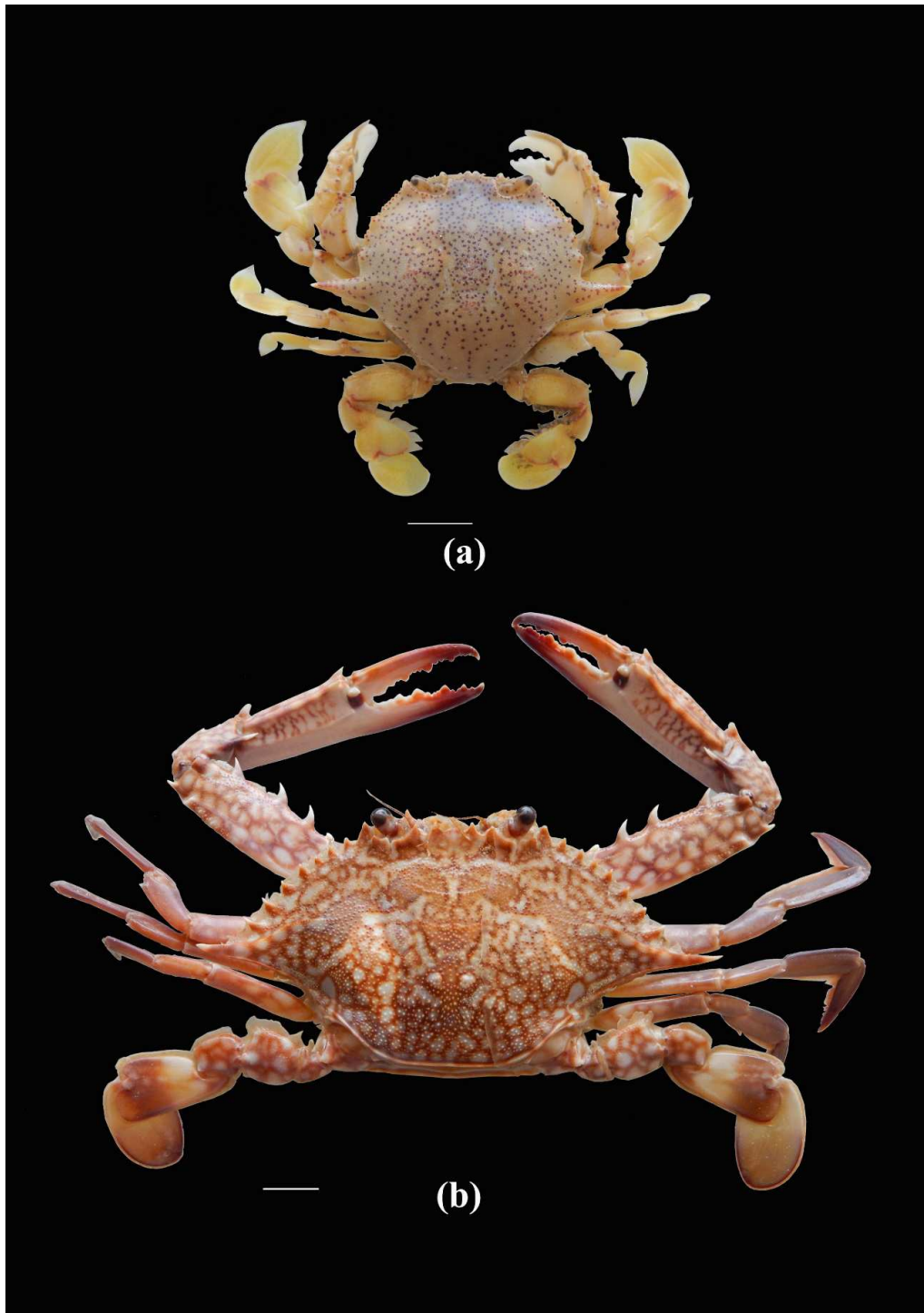


FIGURE 2. Entire animal dorsal view (a) *Matuta victor* (Fabricius, 1781) male, (1) CL: 37.7 mm, CW: 40.5 mm, (b) *Portunus segnis* (Forskål, 1775) male. (1) CL: 43.7 mm, CW: 76.4 mm (Bar represent size = 1 cm).

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