Chapter 3

SYSTEMATICS OF MARINE PRAWNS AND SHRIMPS: A TAXONOMICAL APPROACH

CONTENTS

3.1 Introduction

Gujarat has vast natural marine resources, which accommodate a remarkable assemblage of crustaceans (shrimps, lobsters, crabs, etc.). Among them, shrimps and prawns are predominant. They are benthic organisms that play an essential role in establishing ecological balance by consuming detritus. The shrimp fisheries constitute one of the dominant high price groups of invertebrates in Gujarat's marine fishery sector. Shrimps are one of the significant marine resources of the Gujarat coast. The annual shrimps export is 4300 tons generating foreign revenue of about 80 crores (Dash et al., 2012). Because of the increasingly prominent role of marine prawns and prawn products in the country's economy, the taxonomic identity of different species exploited from the crustacean fishing grounds is important for the sustainable management and development of the marine prawn wealth of Gujarat. The commercial prawn landed at various landing centers of Gujarat is an assemblage of a wide array of species representing multiple families, the prominent being Penaeidae and Solenoceridae, while the family Palamonidae contributes to only a small amount of the trawl catches in Gujarat. It also forms an important component in the food chain of marine species.

In Gujarat, taxonomic studies on prawn and shrimp fauna are very scanty and sparse. Several workers have dealt with the stock assessment, biological, and population study of the commercially important prawns species (Ramamurthy, 1963a; 1963b; George et al., 1963; Deshmukh,1975; Joseph and Soni, 1986; Pravez et al., 1992; Chakraborty and Thumber, 2005; Deshmukh, 2006; Ghosh et al., 2012). Several researchers have dealt with the diversity and taxonomy of the commercial species; out of these, only a few studies have focused on the taxonomy of intertidal species (George et al., 1963; Pérez Farfante, 1987; George and Rao, 1968; Chanda and Roy, 2004; Subba Rao and Sastry, 2005; Saravanakumar et al., 2007; Unmesh and Prakash, 2011; Beleem et al., 2019). In this chapter, the present study holds much significance, as it provides a proper systematic account of prawns and shrimps reported along the coastal area of Gujarat, including the two union territories Daman and Diu.

3.2 Material and Methods

3.2.1 Sample collection

The sampling was done from 59 sites along the Gujarat coastal area from 2015 to 2019 (figs. 2.1, 2.2, & 2.3). Various methods were employed for the collection of prawns and shrimps. Hand-picking and the handheld net method were adopted to collect intertidal shrimp species during the low tides. The fish landing center and local fish markets were also visited for the collections, where the trawler catch was examined for commercial species of prawn. The fish landing centers' location, type of fishing trawlers, approximate depth of sample collected, gears used, etc. all this information was collected from the fishermen. The fresh specimen's photographs were taken immediately after the collection for bright and fresh coloration, and then the samples were preserved and brought to the laboratory.

3.2.2 Relaxation of specimens

All the live samples were narcotized first to avoid dissection and diagnosis difficulties during the morphological identification. Narcotization was

obtained with menthol crystal and by chilling and freezing the live specimens. For a few minutes, the specimen was submerged in the solution. After this, the samples were ready for preservation or morphological analysis.

3.2.3 Preservation for Morphological Analysis

Samples for the morphological examination were immersed in 4% formalin for 4-6 hours and later transferred in 10% formalin (v/v). Formalin denatures DNA by rendering it unavailable by binding the surrounding histone proteins so that the isolation of DNA for genetic research is more complicated and, in some cases, impossible.

3.2.4 Morphological Identification and Deposition

In order to identify each specimen up to the species level using morphological characters (Annexure 3.1), the following steps were considered. The coloration was observed immediately after the collection of samples. Detailed morphometry and sex determination were carried out for each specimen. The taxonomically important body parts were dissected and examined under a stereomicroscope. All the specimens were identified up to the species level using various identification keys, monograms, and taxonomic literature. The detailed sketches of body parts were prepared for different species, and photographic identification plates were prepared. The total length (TL- tip of the rostrum to tip of telson) and carapace length (CL-tip of the rostrum to the posterior end of the carapace) were measured for all the specimens of every species using the digital vernier caliper (± 0.1 mm accuracy). Smaller samples, mostly caridean, were measured using the stereomicroscope equipped with the measuring tool. For the validation of taxonomic classification, the species detailed were compared with the details available on Marine Species Identification Portal Website (www.speciesidentification.org), and the classification was adopted from the world Registered of Marine Species website (www.marinespecies.org). All the identified species were deposited into the Museum at the Department of Zoology, Faculty of Science, The Maharaja Sayajirao

University of Baroda, Gujarat, India, with a unique museum accession code (*e.g.*, ZL-AR-PR-1: *Metapenaeus affinis*) assigned for each species. A clear label was given to the specimen bottles with species accession number, scientific name, family name, collection site, and collector's name. All the families, genera as well as the species, and their synonyms are listed following the criteria of WoRMS, and the taxa within the families are ordered alphabetically.

3.3 Data analysis and Results

Systematics

Phylum	Arthropoda
Superclass	Crustacea Pennant, 1777
Class	Malacostraca Latreille, 1806
Subclass	Eumalacostraca Calman, 1904
Order	Decapoda Latreille, 1803

A total of 52 species of prawns and shrimps were identified during the present study. On analysis, it was observed that they belong to 11 families under the Order **Decapoda** Latreille, 1802 (Table 3.1). The taxonomic details and description of suborder, order, families, genera, and species recorded are given below. The Order Decapoda has been divided into two suborders, namely, Suborder **Dendrobranchiata** Bate, 1888, and Suborder **Pleocyemata** Burkenroad, 1963. Among the families, the highest number of species was recorded from Family Penaeidae (species) followed by (species).

Table 3.1 List of prawn and shrimp species identified along the coastal area of Gujarat during the present study.

*** First record from India; ** First record from West coast of India; *** First record from Gujarat.**

Suborder	Infra-order	Superfamily	Family	Genus	Species
Dendro-branchiata		Penaeoidea	Penaeidae	*Ganjampenaeopsis*	*Ganjampenaeopsis uncta* (Alcock, 1905)
				Megokris	*Megokris granulosus* (Haswell, 1879) ***
					Megokris sedili (Hall, 1961) ***
				Metapenaeopsis	*Metapenaeopsis barbata* (De Haan, 1844)
					*Metapenaeopsis stridulan*s (Alcock, 1905)
				Metapenaeus	*Metapenaeus affinis* (H. Milne Edwards, 1837
					Metapenaeus brevicornis (H. Milne Edwards, 1837)
					Metapenaeus dobsoni (Miers, 1878)
					Metapenaeus kutchensis George, George & Rao, 1963
					Metapenaeus monoceros (Fabricius, 1798)
					Metapenaeus moyebi (Kishinouye, 1896)
				Mierspenaeopsis	*Mierspenaeopsis hardwickii* (Miers, 1878)

					Mierspenaeopsis sculptilis (Heller, 1862)
				Parapenaeopsis	*Parapenaeopsis stylifera* (H. Milne Edwards, 1837)
				Parapenaeus	*Parapenaeus fissuroides indicus* Crosnier, 1986***
					Parapenaeus longipes Alcock, 1905
				Penaeus	*Penaeus canaliculatus* (Olivier, 1811)
					Penaeus indicus H. Milne Edwards, 1837
					Penaeus japonicus Spence Bate, 1888
					Penaeus latisulcatus Kishinouye, 1896
					Penaeus merguiensis de Man, 1888
					Penaeus monodon Fabricius, 1798
					Penaeus penicillatus Alcock, 1905
					Penaeus semisulcatus De Haan, 1844
				Trachysalambria	*Trachysalambria curvirostris* (Stimpson, 1860)
			Solenoceridae	*Solenocera*	*Solenocera choprai* Nataraj, 1945***
					Solenocera crassicornis (H. milne Edwards, 1837)
					Solenocera koelbeli de Man, 1911

Pleocyemata	Axiideae		Callianassidae	*Gilvossius*	*Gilvossius rotundicaudatus* (Stebbing, 1902) *
				Neocallichirus	*Neocallichirus jousseaumei* (Nobili, 1904)
	Caridea	Alpheoidea	Alpheidae	*Alpheus*	*Alpheus chiragricus* H. Milne Edwards, 1837*
					Alpheus edwardsii (Audouin, 1826) ***
					Alpheus lobidens De Haan, 1849***
					Alpheus malabaricus (Fabricius, 1775) ***
					Alpheus pacificus Dana, 1852 ***
				Athanas	*Athanas dimorphus* Ortmann, 1894***
					Athanas parvus de Man, 1910*
				Synalpheus	*Synalpheus coutierei* Banner, 1953**
			Hippolytidae	*Exhippolysmata*	*Exhippolysmata ensirostris ensirostris* (Kemp, 1914)
				Latreutes	*Latreutes anoplonyx* Kemp, 1914***
				Saron	*Saron marmoratus* (Olivier, 1811)
			Lysmatidae	*Lysmata*	*Lysmata vittata* (Stimpson, 1860) ***
			Thoridae	*Thor*	*Thor amboinensis* (de Man, 1888) **
		Palaemonoidea	Palaemonidae	*Ancylocaris*	*Ancylocaris brevicarpalis* Schenkel, 1902

				Cuapetes	*Cuapetes grandis* (Stimpson, 1860) ***
				Nematopalaemon	*Nematopalaemon tenuipes* (Henderson, 1893)
				Palaemon	*Palaemon styliferus* H. Milne Edwards, 1840
					Palaemon pacificus (Stimpson, 1860) ***
					Palaemon serrifer (Stimpson, 1860) ***
		Pandaloidea	Pandalidae	*Procletes*	*Procletes levicarina* (Spence Bate, 1888) **
	Gebiidea		Upogebiidae	*Upogebia*	*Upogebia carinicauda* (Stimpson, 1860) ***
	Stenopodidea		Spongicolidae	*Microprosthema*	*Microprosthema validum* Stimpson, 1860**

Key to the Suborder of the Decapoda Latreille, 1802

1. Pleura of the second abdominal segment not overlapping those of first and second segments …….. **Dendrobranchiata**

—Pleura of the second abdominal segment overlapping those of first and second segments …….. **Pleocyemata**

Suborder **Dendrobranchiata Bate, 1888**

Penaeidea De Haan, 1833-1850:1-31, 9-16, 1-243, plts. A-J, L-Q, 1-55.

***Diagnosis*-** Dendrobranchiate gills present; second pleura of abdominal segment do not overlap those of first and second abdominal segments; prominent hinges present between abdominal somites; females are free spawners, release directly into water and hatch as a nauplius larva; petasma present in male; thelycum in female; in male pleopods without appendix interna.

The Suborder **Dendrobranchiata** has been divided into two superfamilies: **Penaeoidea** Rafinesque, 1815, and **Sergestoidea** Dana, 1852.

Keys to the superfamilies of the suborder Dendrobranchiata occurring in India (in Gujarat*)

1. Some thoracic somites with at list three branchiae on each side. At list 11 branchiae present on each side…….. **Penaeoidea***

— Nevermore than two branchiae per thoracic somite, never more than 7-8 branchiae per side …….. **Sergestoidea**

Superfamily **Penaeoidea Rafinesque-Schmaltz, 1815**

***Diagnosis*-** All pereiopods pairs well developed; pleurobranchia (side gill) present at least on somite ninth (Mxp3); a few somites with at list three branchiae on each side; total number of well develops gills at list 11 on each side.

The Superfamily Penaeoidea Rafinesque-Schmaltz, 1815, has been divided into five families.

Keys to the families of the superfamily Penaeoidea occurring in India (in Gujarat*)

1. Postorbital spine present …….. **Solenoceridae***

— Postorbital spine not present …… **2**

2. Integument rigid and stony; P3 to P5 uniramous, lacking endopods ……. **Sicyoniidae**

—Integument not stony, P3 to P5 biramous …… **3**

3. 1 to 3 rostral/postrostral teeth.…… **Benthesicymidae**

—More than two rostral/postrostral teeth …… **4**

4. Postartema well developed …… **Penaeidae***

—Postartema reduced to setose …… **Aristeidae**

Among the **5** families, **28** species belonging to **2** families have been collected. A detailed study has been made and presented below. A family-level identification key was also provided here.

Family **Penaeidae Rafinesque, 1815**

Diagnosis- Body compressed, slender; rostrum well developed, extending to or beyond distal margin of eyes, tooth armed on dorsal side of rostrum, sometimes on ventral side also; carapace without postorbital spine, antennal and hepatic spine usually present, cervical groove well defined, ending ventral to dorsal midline; abdominal somites craniate from posterior side; third to fifth pereiopods biramous; petasma semi-open or semi-closed; in male second pleopod bearing appendix masculine; thelycum open or closed; telson pointed with or without a lateral spine.

Key to the genera of the family Penaeidae occurring in India (in Gujarat*)

1. Serrated only on the dorsal margin …… **6**

—Rostrum serrated on the dorsal and ventral margins …… **2**

2. Adorostral carina (ridges flanking the rows) and groove extend as far as the level of epigastric tooth, gastro-frontal carina absent …… **3**

—Adorostral carina and groove extend behind epigastric tooth; gastro-frontal carina present …… **5**

3. Hepatic carina generally absent or feebly present…..... ***Fenneropenaeus***

—Hepatic carina present and prominent …….... **4**

4. Thelycum open; petasma with ventral costa short, not reaching distal margin of lateral lobes ……..... ***Litopenaeus***

—Theycum closed; petasma with ventral costa long, reaching distal margin of lateral …… ***Penaeus****

5. Gastrofrontal groove not markedly bifid posteriorly; thelycum with pair of a lateral plate on sternite fourteenth shielding sac-like seminal receptacle opening along midline ……..…….. ***Melicertus****

—Gastrofrontal groove markedly bifid posteriorly; thelycum with an undivided plate on sternite fourteenth infolded laterally, forming pouch opening anteriorly…… ***Marsupenaeus****

6. Telson with pair of fixed subapical spines preceded by 1-3 pairs of movable spines; antennal peduncle usually bearing parapenaeid spine…… **7**

— Telson without fixed subapical spine, but usually with movable lateral spines; antennular peduncle lacking parapenaeid spine…….…….. **9**

7. Carapace with longitudinal suture and transverse suture; telson with only one pair of minute lateral spine anterior to subapical spines …… ***Parapenaeus****

—Carapace without longitudinal suture and transverse suture; telson with two or more pair of conspicuous spines anterior to subapical spines…….. **8**

8.Mxp3 and P2 with basial spine; petasma asymmetrical.....***Metapenaeopsis****

—Mxp3 and P2 without basial spine; petasma symmetrical…… ***Penaeopsis****

9. Pleurobranch present on somite thirteen, exopods on maxillipeds and anterior four pairs of pereiopod; P5 without exopods…..... ***Metapenaeus****

—Pleurobranch absent on somite thirteen; exopod present on all pereiopods…….. **10**

10. Carapace without longitudinal and transverse suture; telson with subapical pair of lateral movable spines mounted on elongate shoulder; epipods not furcated; petasma with ventrolateral lobule produced into three flaps; anterior plate of thelycum as long as broad…….. ***Trachypenaeopsis**** **—** Carapace with either longitudinal suture; telson without lateral spines or with movable spines; petasma with ventrolateral lobule not produced into distal flaps…….. **11**

11. Carapace without longitudinal suture; P2 with ischium spine; hepatic spine present; petasma not constricted distally; anterior plate of thelycum rounded posteriorly……. ***Atyopenaeus*** **—**Carapace with longitudinal suture, P2 without ischium spine..... **12**

12. P3 without epipod; body slender, integument thin….. ***Parapenaeopsis**** **—** P3 with epipod; body thick; third maxilliped lacking basial spine……. **13**

13. Thelycum with a plate on sternite fourteenth very short medially, deeply excavate, embracing extremely long caudal extension of median protuberance; petasma with disto-lateral projection either moderately broad to rather narrow basally and extending laterally too mesially or forward-directed tip……. ***Megokris**** **—** Thelycum with a plate on sternite fourteenth shallowly emarginated or occasionally produced in small median prominence, not continuous with median protuberance; petasma with disto-lateral projections tapering gently from a relatively narrow base, extending almost straight laterally or curving slightly backwards…… ***Trachysalambria**** **14.** Distolateral projections of petasma unilobed…….. ***Ganjampenaeopsis***

Genus ***Ganjampenaeopsis*** **Sakai & Shinomiya, 2011**

Trachypeneus (trachysalambria) Burkenroad, 1934: 1-109.

Diagnosis- Distolateral projections of petasma unilobed, each bearing lobule on dorsal side.

1. ***Ganjampenaeopsis uncta*** **(Alcock, 1905)** (fig. 3.1)

Parapenaeopsis uncta Alcock, 1905: 508-532; Perez Farfante & Kensley, 1997: 121.

Parapenaeopsis uncta Menon, 1956: 346; Mohamed, 1969: 30; George, 1969: 34.

Parapenaeopsis probate Hall, 1961: 76-119, plts. 17-21.

Alcockpenaeopsis uncta (Chanda), 2016: 2-4.

Materials Examined- 1 male (TL-9.2 cm, CL-3.5 cm) (ZL-AR-PR-30), Okha landing center (22°28'46.79" N 69°04'38.40" E), Devbhumi Dwarka District, Gujarat, 6 May 2016, coll. Barkha Purohit. 1 male and 1 female (TL-12.4 cm, CL-4.9 cm; TL-12.1 cm, CL-4.7 cm), Fish landing center, Jakhau (23°14'05.87" N 68°36'37.32" E), Kachchh District, 29 April 2016, coll. Barkha Purohit. 1 male (TL-11.7 cm, CL-4.3 cm), Alang (21°26'34.11" N 72°14'31.21" E), Bhavnagar District, 11 October 2016, coll. Barkha Purohit.

Diagnosis- Integument thick, punctate; rostrum, short stout, extending upto middle of second segment of antennular peduncle, armed with 9-11 dorsal teeth (fig. 3.1a); in young males and females sigmoid shaped, distal ¼ to $^{1}/_{3}$ part toothless and styliform; in adult males, straight; postrostral carina extending upto posterior margin of carapace, sulcate dorsally; epigastric tooth present; adrostral carina and groove not extending beyond epigastric tooth; orbital spine absent; both antennal and hepatic spines prominent; longitudinal suture long extending posteriorly to cardiac region, cervical groove long, hepatic groove horizontal behind hepatic spine, slopes anteriorly towards sharp pterygostomian angle; transverse suture prominent, present on branchial part at the level of P3; antennular flagella equal in length, similar to antennular peduncle, shorter than carapace; dorsal carination on abdomen starting from third abdominal segment, ending at mid-posterior border of sixth somite in a short sharp spine curving downwards; epipod and basial spine present on P1 and P2; in male the endopod of Plp2 modified proximally bi-segmented appendix masculine, formed of short distal and elongated proximal rods; disto-

median projection very low of median lobe of petasma; distolateral projection of lateral lobe of petasma tapering at tip, each with a long dorso-median spine-like process (fig. 3.1b); anterior plate of thelycum broad and short, with curved anterior margin, and two longitudinal ridges, medially fused with the quadrate posterior plate; posterior plate medially possess a series of long hair (fig. 3.1c); telson unarmed, longer than sixth abdominal segment.

Coloration- Fresh specimens are brown and rostrum dark brown. Carapace laterally yellowish, a large dark brown patch present on the posterior region of the dorsal side. The abdomen is brown banded with white areas. The pereiopods and pleopods are yellow-red or sometimes brownish. Uropods are proximally brown colored and distally black, with a white-bluish band on the distal half.

Zonation and Habitat- This species has been collected from trawl catch, depth of 5 to 20 m.

Distribution- This species is previously known from Indo-West Pacific, Sri Lanka, Bangladesh, India, Pakistan, and Singapore (Holthuis, 1980; Thomas, 1969a).

In India, the species is previously reported from both East and West coast: Gujarat, Kerala (Radhakrishnan et al., 2012), Tamil Nadu (Thomas, 1969a), Andhra Pradesh (Rath et al., 2016), Odisha, and Bay of Bengal (Pravin and Manohardoss, 1996; Radhakrishnan et al., 2012).

Commercial/Ecological Importance- This species has fisheries potential and is used as a food source.

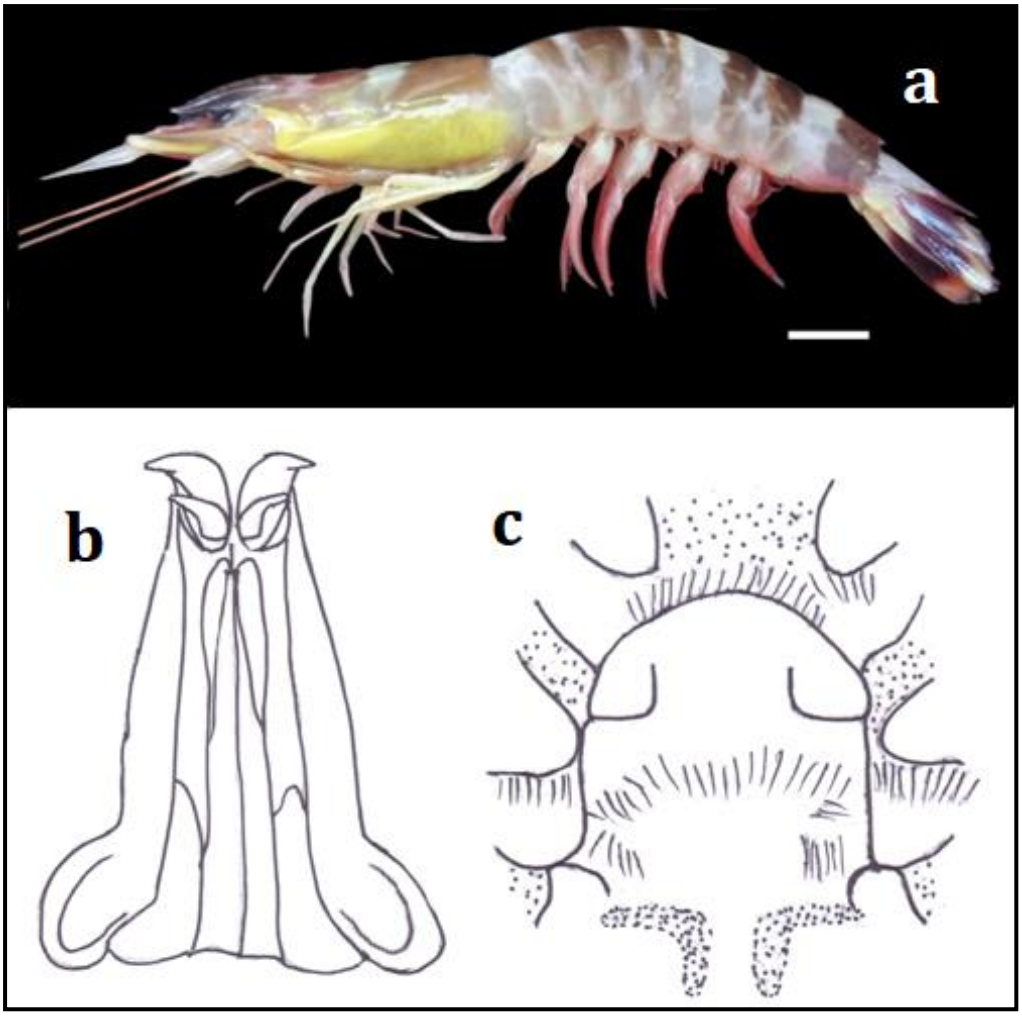

Figure 3.1 *Ganjampenaeopsis uncta* (Alcock, 1905): a. Female lateral view; b. Petasma; c. Thelycum. (Scale bar= 1cm).

Genus ***Megokris*** **Pérez Farfante & Kensley, 1997**

Diagnosis- Body densely pubescent; rostrum short, reaching between end of first antennular segment; only dorsal teeth present; epigastric tooth distinctly present; orbital angle sharp or with a small spine; antennal and hepatic spine present on carapace; pterygostomian angle blunt or acute; postocular groove shallower obsolete; gastroorbital carina lacking; cervical groove short; branchiocardiac carina usually absent; sometimes clearly distinct; sixth abdominal somites lacking cicatrix; Mxp3 without basial spine; P1 and P2 with basial spine; spine present on ischium of P1, absent on P2; petasma symmetrical, variable in shape; semi-closed with lateral lobes projecting distolaterally hornlike; appendix masculina sub quadrangular, corners rounded; thelycum closed with a large plate, deeply

excavate anteriorly, anterior plate tongue like; telson with three pair of movable lateral spines.

2. *Megokris granulosus* (Haswell, 1879) (fig. 3.2)

Penaeus granulosus Haswell, 1879: 38-44
Trachypenaeus granulosus (Haswell, 1879): 38-44.
Trachypeneus furcilla Hall, 1961: 76-119, plts. 17-21
Trachypeneus salaco de Man, 1907: 127-147

Materials Examined- 1 male and 5 females (TL-11.2 cm, CL-4.2 cm; TL-8.7 cm, CL-3.0 cm; TL- 10.5 cm, CL-3.3 cm; TL- 9.6 cm, CL-3.22 cm; TL- 8.2 cm; CL-2.95 cm; TL-9.8 cm; CL-3.8 cm) (ZL-AR-PR-28), Subhas Nagar landing center (21°38'24.68" N 69°35'40.77" E), Porbandar District, 10 February 2015, coll. Barkha Purohit.

Diagnosis- Integument thick, densely pubescent (fig 3.2a); carapace and abdominal segments covered with granules and fine seta; rostrum short, reaching up to $^{3}/_{4}$ of antennular portion, straight in female and upcurved in male, armed with 9-11+1 dorsal teeth, space between teeth increase from before backwards, last two spines separated by extensive distance, without ventral teeth not present; hepatic and cervical grooves distinguish; short longitudinal suture present; pterygostomian angle blunt; eyes large (fig. 3.2b); tubercle present on second abdominal segment, mid-dorsal carina present on last four abdominal segments, mid-dorsal carina of sixth segments ends with a blunt spine; epipod present on P3 only; P5 reaching beyond antennular peduncle; in male, petasma with very broad distolateral projection, tips curving forward in a broad sweep and then inwards (fig. 3.2c); in female, interior plate of thelycum flat or slightly concave rounded distally with a posterior rounded projection which can be prominent often fused with the posterior plate (fig. 3.2d); telson with a pair of small subapical movable spine and two to three pairs of spinules.

Coloration- Generally, fresh specimens are light brown. The sides of the carapace, abdomen, third and fifth pereiopods are bright yellow. The

uropods are red with yellow patches. The distal ⅓ part of the telson is yellow with a red tip.

Zonation and Habitat- This species has been collected from trawl catch, depth of 9 to 25 m.

Distribution- This species is previously reported from the Philippines, Kuwait, Taiwan, Malaysia, Pakistan, Australia, Hong Kong, New South Wales, Indonesia, and Sri Lanka (Haswell, 1897).

In India, the species is previously reported from both East and West coast: Gujarat (Radhakrishnan et al., 2011), Andhra Pradesh (Rath et al., 2016), and Tamil Nadu (Thomas, 1969a).

Commercial/Ecological Importance- This species has commercial importance.

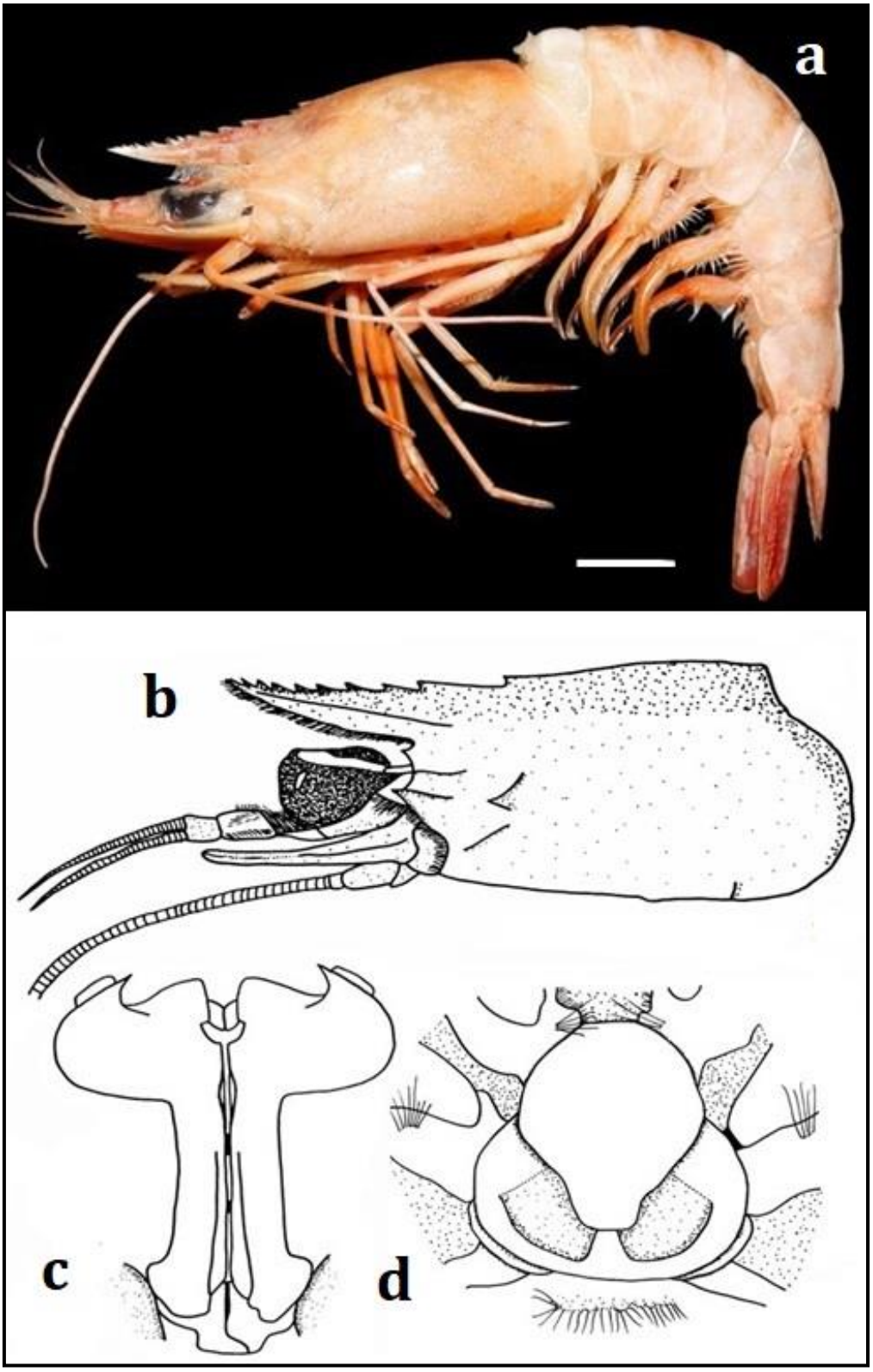

Figure 3.2 *Megokris granulosus* (Haswell, 1879): a. Female lateral view; b. carapace lateral view; c. Petasma; d. Thelycum. (Scale bar= 1cm).

3. *Megiokris sedili* (Hall, 1961) (fig. 3.3)

Trachypeneus sedili Hall, 1961: 100-102; 1962: 30; de Bruin, 1965: 92-93.
Trachypenaeus sedili Racek and Dall, 1965: 92; Mohamed, 1969: 30; George, 1969: 33.

Material Examined- 1 male and 2 females (TL-9.4 cm, CL- 4.1 cm; TL-10.4 cm, CL-4.5 cm; TL-9.8 cm, CL-4.2 cm) (ZL-AR-PR-29), Subhas Nagar landing center (21°38'41.35" N 69°35'33.30" E), Porbandar District, 10 February 2015, coll. Barkha Purohit.

Diagnosis- Entire body densely pubescent (fig. 3.4a); carapace and abdominal segments highly setose; rostrum distinctly curved upward, armed with 8+1 dorsal teeth, reaching up to half of third antennular segment; dorsal groove short; post ocular, gastro frontal and gastro orbital carina absent; small well defined orbital spine present; hepatic spine present; antennal carina well developed and terminating with a prominent antennal spine; post orbital spine absent; prominent spine present on dorsal side of basal segment of ocular peduncle; no branchiocardiac carina; branchiostegal spine absent; pterygostomian angle straight; stylocerite distally pointed, reaching nearly half of corneal length; scaphocerite distolateral spine reaching up to end of antennular peduncle (figs. 3.2a & b); P1 reaching little beyond middle of carpocerite, P1 and P2 bearing curved long basal spine; P2 reaching middle of scaphocerite; P3 to P5 length almost similar, reaches little shorter then scaphocerite tip; second antennular segment two times longer than first antennule segment; second to sixth abdominal segments carinated; second abdominal segment elevated and small dorsal tubercle present, mid dorsal carina present on last four segments; sixth segment carina ending with a short spine, posteroventral angle of sixth abdominal segment produced into spine; in male, petasma long, horn like distolateral projection directed laterally, tips slightly curving forward, small disto-median projection, ventrally curved (fig. 3.3c); in female, thelycum with chair like appearance, anterior and lateral margins of anterior plate sharply raised (fig 3.3d); telson longer

than sixth abdominal segment, exceeding the uropods by distal spine, four pairs small movable spine present; dorsal groove deep, straight spinule present, marginal spine large and movable.

Coloration- The whole body is yellowish-brown with dark yellow patches. The rostrum and posterior margin of the carapace and telson tip is brown. Antennules and pereiopods tips are white. Antennae are light pink with a dark pink base.

Zonation and Habitat- This species has been collected from trawl catch, depth of 5 to 22 m.

Distribution- This species is previously reported from Mozambique, Sri Lanka, Myanmar, Singapore, Strait of Malacca, Gulf of Thailand, Gulf of Tonkin, South China Sea (Chanda, 2018).

In India, the species is previously reported from both East and West coast: Andhra Pradesh (Rath et al., 2016), Kerala, and Tamil Nadu (Thomas, 1969a; Radhakrishnan et al., 2011).

Commercial/Ecological Importance- This species has fisheries potential.

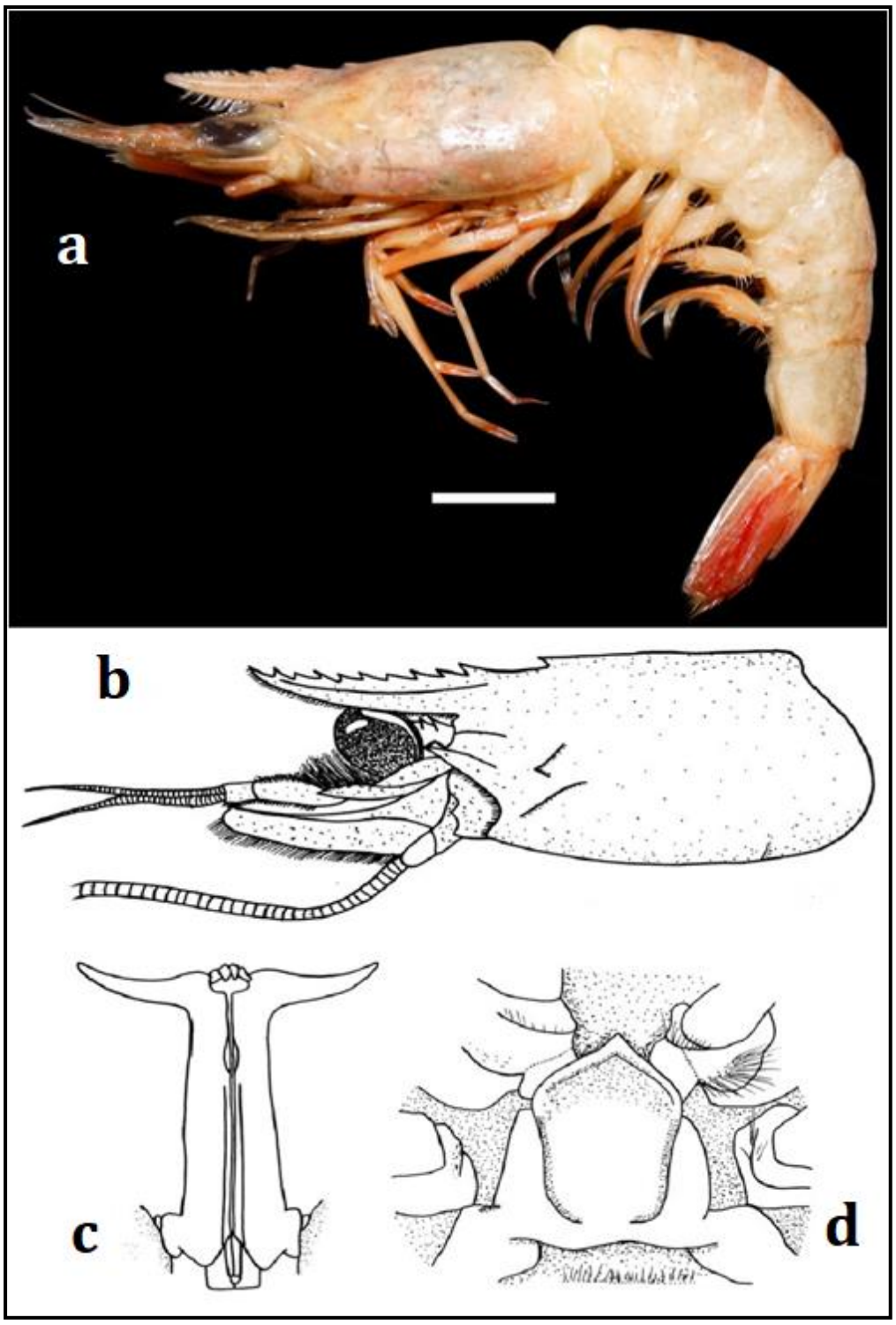

Figure 3.3 *Megokris sedili* (Hall, 1961): a. Female lateral view; b. Carapace; b. Petasma; c. Thelycum. (Scale bare= 1cm).

Genus Metapenaeopsis Bouvier, 1905

Diagnosis- Body pubescent; rostrum with only dorsal teeth; carapace without sutures; antennal, pterygostomian and hepatic spines well

developed; orbital spine small; telson with a pair of fixed lateral sub-apical spines and several pairs of movable lateral relatively large spines anterior to fixed pair; antennular flagella variable in length usually shorter and sometimes longer than carapace; Mxp3, P1 and P2 with basial spines, lacking on P3; petasma asymmetrical, divided transversely at about mid-length, half with dorsolateral lobules produced proximally into spur-like projections, left one oblique directed medially and longer than right; thelycum consists of a well-developed median plate on the thirteenth sternite.

4. *Metapenaeopsis barbata* (De Haan, 1844) (fig. 3.4)

Penaeus barbatus De Haan, 1844: 1-243, plts. A-J, L-Q, 1-55.
Parapenaeus akayebi Rathbun, 1902: 23-55.
Metapenaeopsis barbatus Kubo, 1949: 413-19; Dall, 1957: 17; Hall, 1961: 105.

Materials Examined- 1 male and 2 females (TL-9.4 cm, CL- 3.2 cm; TL-10.4 3.7 cm, TL-6.3 cm, CL-2.7 cm) (ZL-AR-PR-29), Subhash Nagar landing center (21°38'24.45" N 69°35'44.19" E), Porbandar District, 08 February 2017, coll. Barkha Purohit.

Diagnosis- Rostrum straight, reaching tip of third segment of antennular peduncle, armed with 5+1 dorsal teeth, epigastric tooth separated from penultimate tooth; penultimate tooth slightly anterior to orbital margin; stridulating organ present on posterior branchiostegite of carapace as a curved band; hepatic, antennal and pterygostomian spines prominent(figs.3.4a & b); antennular flagella equal and short; parapenaeid spine prominent; left distoventral projection of petasma triangular, distally bearing 8-9 short processes on the median margin, three to four long processes on outer margin; dorsal intermediate projection about twice as long as broad, thin, leaflike; outer dorsomedian lobe oval, distal end covered with minute tubercles; a small triangular lobe projects ventrolaterally from the outer margin of this oval plate; right distoventral projection with three processes at tip; disto-median lobule broad

anteriorly ending in a slightly twisted anteromedian projection; distoventral projection truncately conical, spirally convoluted distally (fig. 3.4c); anterior thelycal plate on sternite thirteen wider than long with rounded and elevated anterolateral corners; intermediate plate on sternite fourteen slightly sunken, compared to the rest of the thelycum, covered with setae; posteriorly a shallow transverse groove separates it from the anterior sternal plate which has an ill-defined median convexity; two small semicircular protuberance overhang lateral ends of intermediate plate; posterior thelycal plate on sternite fourteenth has two prominent lateral lobes and a lower median elevation (fig. 3.4d); coxal plate of P5 possess dense setae.

Coloration- Body whitish molted with irregular red blotches. The antennal flagella indistinctly crossed with red and white color bands. The distal part of uropods is reddish, and the basal parts pale yellowish.

Zonation and Habitat- This species has been collected from trawl catch, depth of 20 to 70 m.

Distribution- This species is distributed throughout the Indo-west Pacific: Previously known from Japan, Korean Peninsula, Hong Kong, Taiwan, Thailand, Indonesia, Malaya, India, and the Red Sea (Holthuis, 1980; Chanda, 2015).

In India, the species is previously reported from both East and West coast: Gujarat, Palk Bay, Tamil Nadu, and Andhra Pradesh (George and Muthu, 1968a; Chanda, 2015).

Commercial/Ecological Importance- This species has fisheries potential.

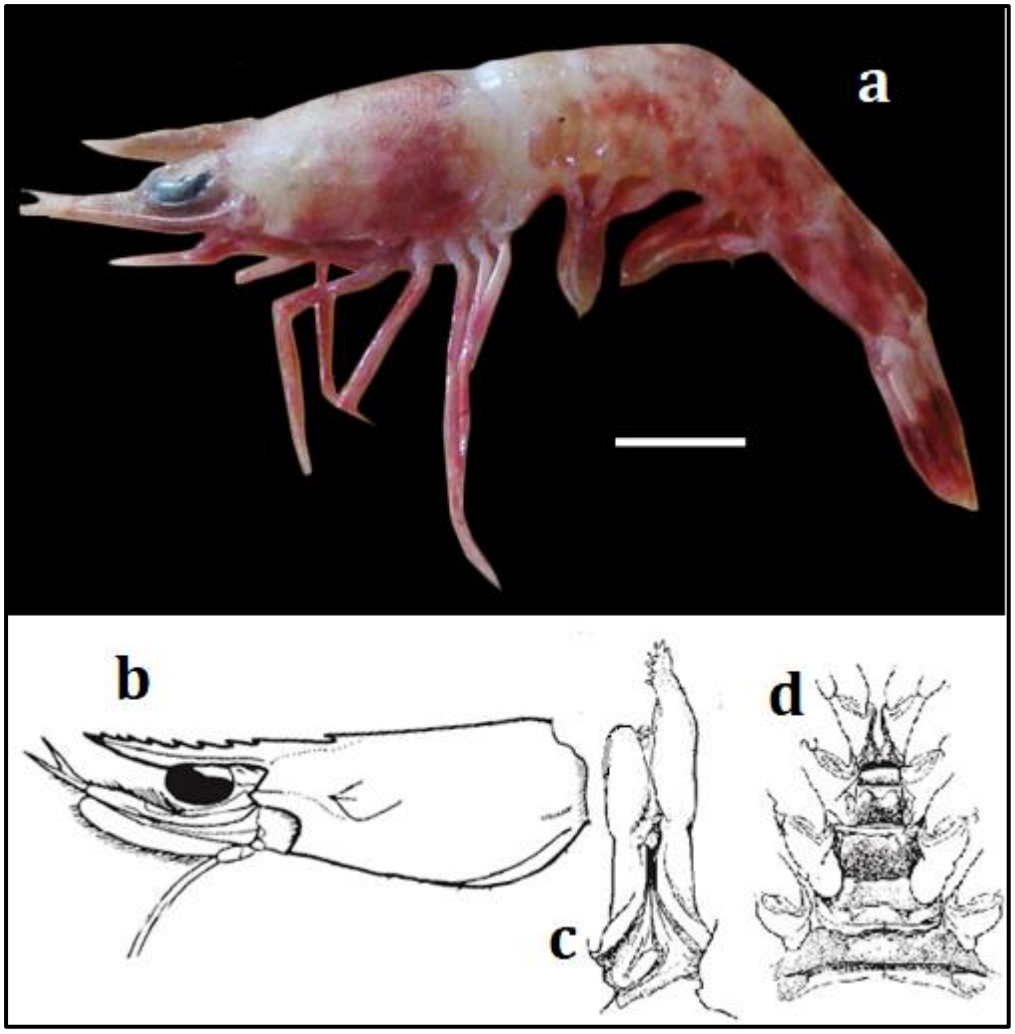

Figure 3.4 *Metapenaeopsis barbata* (De Haan, 1844): a. Female lateral view; b. Carapace; c. Petasma; d. Thelycum. (Scale bare =1 cm).

5. ***Metapenaeopsis stridulans* (Alcock, 1905)** (fig. 3.5)

Metapeneus stridulans Alcock, 1905:508-532.
Metapenaeopsis stridulans Hall, 1962: 359-414.

Materials Examined- 1 male and 2 females (TL-9.4 cm, CL- 3.2 cm; TL-10.4 cm, CL-3.5; TL-8.2 cm, CL-4.8 cm) (ZL-AR-PR-26), Subhash Nagar landing center (21°38'24.45" N 69°35'44.19" E), Porbandar District, 08 February 2017, coll. Barkha Purohit.

Diagnosis- Rostrum short, straight and slightly uptilted; reaching upto the third segment of antennular peduncle; dorsal side armed with 7+1 teeth, no ventral tooth; postrostral carina absent in both sex; penultimate tooth

anterior to frontal margin of carapace; epigastric tooth separated from penultimate tooth; entire carapace covered with dense short tomentum; orbital spine small but sharp; orbito-antennal groove slightly shallow; hepatic spine small (fig. 3.5a); antennal spine prominent, reaching upto cornea; branchiostegal spine small, but sharp and conspicuous; 5-7 strong stridulating ridges in a broad straight band on the posterior part of carapace; antennular flagella short, equal in length; second abdominal somite dorsally carinated, bearing a well-defined shallow groove in both sexes; third to sixth abdominal somites strongly carinated; mid-dorsal carina on third abdominal segment with a broad groove; petasma pointed, asymmetrical, right distoventral projection shorter and bearing a few small apical processes, left distoventral projection with 5-12 large apical processes; inner intermediate strip broadly quadrangular, disto-median lobule slightly shorter but much broader (fig. 3.5b); anterior plate on thelycum plate subquadrate with rounded corners and somewhat broader than long, posterior plate broadly taperdodial, much broader than long, with a shallow median groove arranged transversely (fig. 3.5c); coxal plate of P4 smaller than anterior thelycum plate.

Coloration- The Carapace, abdomen, and telson with red to brown molting, and the base is cream. The pereiopods are pinkish to dark red molting and proximal parts white.

Zonation and Habitat- This species has been collected from trawl catch, depth of 20 to 70 m.

Distribution- This species is distributed along the Gulf of Aden, Persian Gulf, Gulf of Oman, Sri Lanka, India, Malaysia, Singapore, Thailand, Vietnam, China, Philippines, and Indonesia (Chanda, 2015).

In India, the species is previously reported from both East and West coast: Gujarat, Maharashtra, Kerala, Tamil Nadu, and Andhra Pradesh (Radhakrishnan et al., 2011; Chanda, 2015).

Commercial/Ecological Importance: Commonly used as a food source. Gujarat is the major landing center.

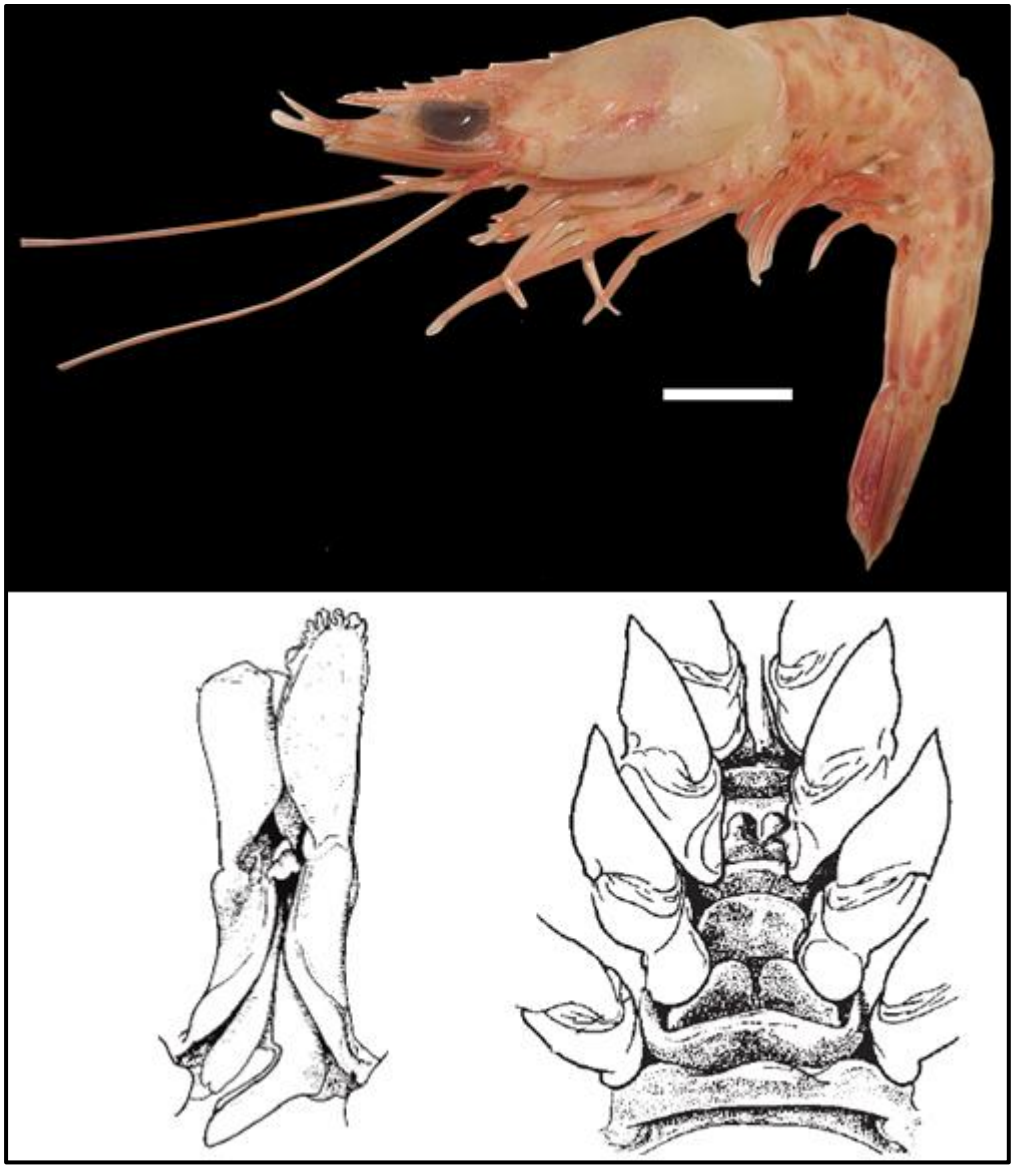

Figure 3.5 *Metapenaeopsis stridulans* (Alcock, 1905): a. Female lateral view; b. Petasma; c. Thelycum. (Scale bare=1 cm).

Genus *Metapenaeus* Wood-Mason in Wood-Mason & Alcock, 1891

Mangalura Miers, 1878: 298-310.

Diagnosis- Body pubescent or glabrous; rostrum armed with dorsal teeth only; carapace with blunt orbital spine, antennal and hepatic spines well defined; orbital and pterygostomian spine absent; gastro-orbital carina

absent; orbit antenna, cervical and hepatic groove prominent, inclusive by ventral carina, hepatic groove anterior to hepatic spine, hepatic carina descends vertically from spine; branchiocardiac carina developed variably in different species, sometimes indistinct; transverse and longitudinal suture absent; sixth abdominal somite with single long or interrupted cicatrices; telson lacking subapical fixed spine, has movable sometimes minute, numerous posterolateral spines present; antennule lacking parapeneid spine, flagella moderate, slender, shorter than carapace; basial spine present on P1 to P3; in some species ischial spine present on P1; P5 modified in male; ischium usually bearing distolateral keel shaped structure, merus with proximal notch followed by a distal conspicuous knob or spiniform process; exopod lacking on P5; petasma symmetrical, semi-closed, depressed, median lobes usually produced into curved, hood like, or convoluted distal projections; sclerotized lateral lobes produced distally in spout-like obliquely or entirely lateral projections and with ventrolateral re-curved, flap-like to complex medial process; appendix masculina longer than broad, narrow posteriorly, expanded distally and convex ventrally; thelycum closed, with paired lateral plate on sternite fourteenth often continuous across sternite, usually more or less enveloping posterior end of elongate median protuberance of sternite thirteenth.

6. *Metapenaeus affinis* (H. Milne Edwards, 1837) (fig. 3.6)

Metapenaeus ivanovi Hassan, 1978: 385-390.
Metapenaeus mutatus (Lanchester, 1901): 534 – 574, plts. 33 – 34.
Metapenaeus necopinans Hall, 1956: 68-90, plts. 8-12
Penaeus affinis H. Milne Edwards, 1837: 638, plts. 1 – 42.

Materials Examined- 1 male and 1 female (TL-7.6 cm, CL-2.7 cm; TL-7.7 cm, CL-2.8 cm) (ZL-AR-PR-01), Subhash Nagar landing center (21°38'24.45" N 69°35'44.19" E), Porbandar District, 08 February 2017, coll. Barkha Purohit. 1 female (TL- 8.7 cm, CL-3.9 cm), Nada (22°57'39.00" N 72° 42'38.00" E), Bharuch District, 20 October 2018, coll. Barkha Purohit.

2 females (TL-9.3 cm, CL-3.1 cm; TL-9.8 cm, CL-3.9 cm), Fish landing center, Jakhau (23° 14'05.87" N 68° 36'37.32" E), Kachchh District, 29 April 2016, coll. Barkha Purohit.

Diagnosis- Whole-body partially or entirely hairless, pubescent (fig. 3.6a); rostrum long, and slender, slightly uptilted tip, armed dorsally 8-11 teeth, posterior part with distinctly elevated carina; adrostral carina ending behind second rostral teeth (fig. 3.6b); antennular flagella equal, shorter than carapace; dorsal carination start from posterior ⅓ of fourth somite ending at posterior margin of sixth somite; sixth and fifth somite with a long cicatrix; short ischium spine present on P1; simple basal spine present on P3 (in female); merus of P5 bearing a proximal notch followed by a twisted keeled tubercle; crested shape disto-median projection on petasma, apical petasmal filament slightly converging and slender (fig. 3.6c); thelycum anterior plate long and deeply groove; lateral plates small with sharply raised lateral margin forming two longitudinal crests (fig. 3.6d); telson with very minute spines.

Coloration- Fresh specimen body generally pale greenish to pale pinkish and sometimes green bluish or pink brownish, green, or brown specks present on the whole body. Pleopod tips are reddish, and telson is dark brown.

Zonation and Habitat- This species has been collected from trawl catch, depth of 10 to 20 m.

Distribution- This species is distributed along the Persian Gulf, Arabian Sea from the Gulf of Oman, Sri Lanka, Malaysia, Singapore, Borneo, Thailand, Gulf of Tonkin, South China Sea, Philippines, Hong Kong, Taiwan, New Guinea, and Hawaii (Chanda, 2014).

In India, the species is previously reported from both East and West coast: Gujarat, Maharashtra, Goa, Kerala, Tamil Nadu, Andhra Pradesh, West Bengal, and Odisha (Chanda, 2014).

Commercial/Ecological Importance: This species commonly used as a food source. Gujarat is the primary landing center.

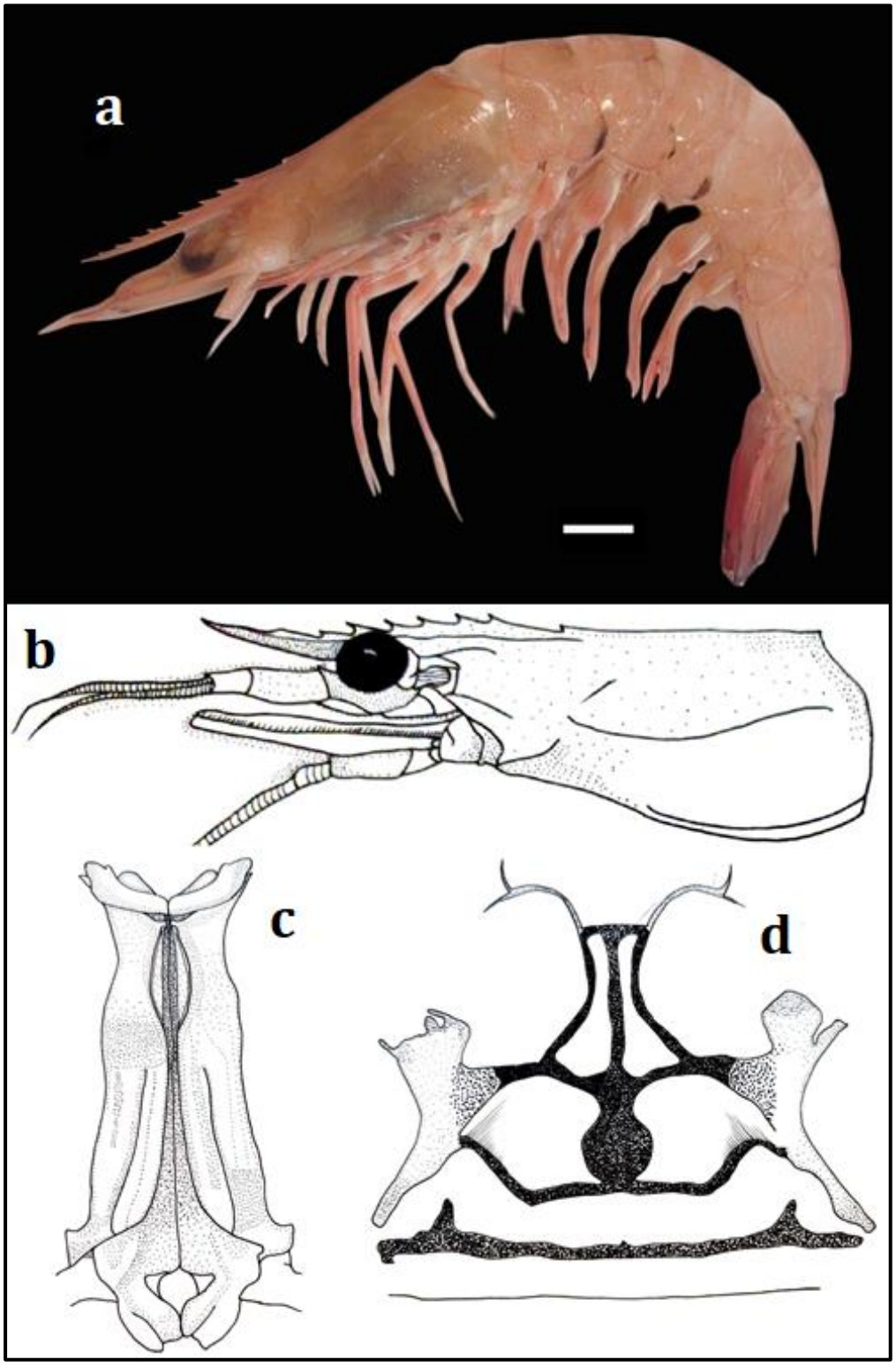

Figure 3.6 *Metapenaeus affinis* (H. Milne Edwards, 1837): a. Female lateral view; b. Carapace; c. Petasma; d. Thelycum. (Scale bare=1 cm).

7. *Metapenaeus brevicornis* (H. Milne Edwards, 1837) (fig. 3.7)

Penaeus avirostris Dana, 1852: 10-28.

Penaeus brevicornis H. Milne Edwards, 1837: 3, plts. 1-42.

Materials Examined- 1 male (TL-10.7 cm, CL-3.8 cm) (ZL-AR-PR-34), Subhash Nagar landing center (21°38'24.45" N 69°35'44.19" E), Porbandar District, 08 February 2017, coll. Barkha Purohit. 1 female (TL- 11.9 cm, CL-7.92 cm), Sartanpar Village (21°18'03.05" N 72°06'19.97" E), Bhavnagar District, 11 October 2016, coll. Barkha Purohit. 1 female and 1 male (TL-7.8 cm, CL-2.7 cm; TL-5.1 cm, CL-1.9 cm), Mandvi (22° 49'27.61" N 69° 21'17.29" E), Kachchh District, 19 March 2016, coll. Barkha Purohit.

Diagnosis- Entire body smooth; rostrum short, armed with 5-7 dorsal teeth, distal end toothless about half or rostrum, crest high; post-rostral carina distinct ending before posterior end of carapace; adrostral crest and groove reaching as far as second rostral tooth; branchiocardiac carina weakly, not reaching middle of carapace, cervical groove very short, hepatic carina anteriorly distinct but posteriorly indistinct, descending towards pterygostomian angle; pterygostomian angle rounded, without spine; dorsal carination begins from posterior region of fourth somite, ending at ultimate end of sixth somite with a short spine, sixth somite with two ventrolateral short spines; ischium of P1 with a small spine; in adult male, merus of P5 with a proximal notch followed by a keel-shaped tubercle; in male each disto-median projection of petasma with long and slender apical filament; in female anterior plate of thelycum large, square and grooved; lateral pate boomerang-shaped and enclosing with two pears shaped plates; telson armed with two large movable spines.

Coloration- Fresh specimens yellow to white, sometimes grayish' dark green to bluish-black small dots on the whole body; pleopods yellowish to pinkish; uropods distal part brown to rusty red, sometimes tips only colored.

Zonation and Habitat- This species has been collected from trawl catch, depth of 5 to 20 m.

Distribution- This species is previously reported from Pakistan, Malaysia, Singapore, Indonesia, Borneo, Thailand, and Vietnam (Chanda, 2014)

In India, the species is previously reported from both East and West coast: Gujarat, Maharashtra, Goa, Andhra Pradesh, Kerala, Tamil Nadu, West Bengal, and Orissa (Chanda, 2014).

Commercial/Ecological Importance- This species is commonly used as a food source.

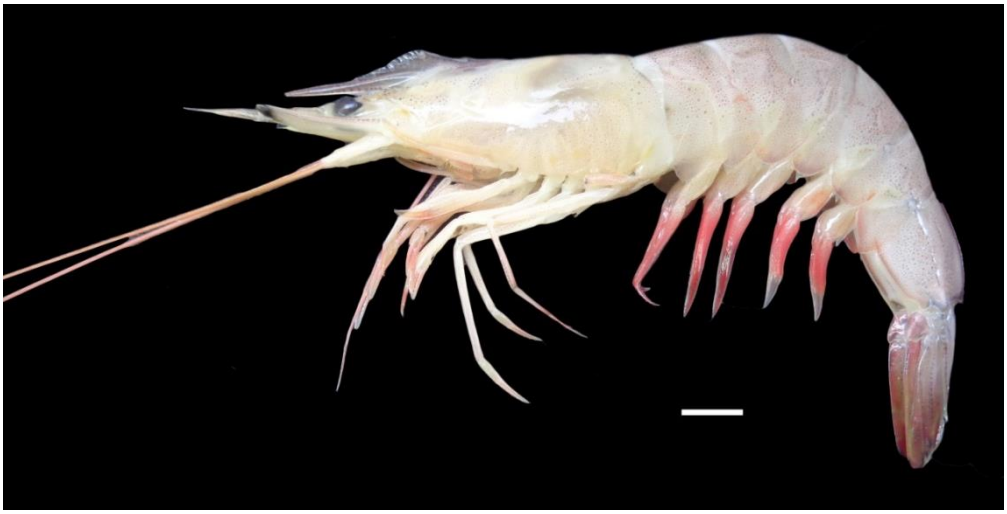

Figure 3.7 *Metapenaeus brevicornis* (H. Milne Edwards, 1837): Female lateral view. (Scale bare=1 cm).

8. *Metapenaeus dobsoni* (Miers, 1878) (fig. 3.8)

Metapenaeus dobsoni choprai Holthuis, 1980: 1-17, 1-271.
Penaeus dobsoni Miers, 1878: 298-310.

Materials Examined- 2 females (TL-5.2 cm, CL-1.9 cm; TL-6.9 cm, CL-2.8 cm) (ZL-AR-PR-02), Subhash Nagar landing center (21°38'24.45" N 69°35'44.19" E), Porbandar District, 08 February 2017, coll. Barkha Purohit. 1 female (TL-4.9 cm, CL-1.6 cm), Kamboi (22° 12'58.53" N 72° 36'53.85" E), Bharuch District, 02 October 2017, coll. Barkha Purohit. 1 female and 1 male (TL-5.1 cm, CL-1.9 cm; TL-7.8 cm, CL-2.7 cm), Fish

landing center, Jakhau (23° 14'05.87" N 68° 36'37.32" E), Kachchh District, 29 April 2016, coll. Barkha Purohit.

Diagnosis- Entire body pubescent; rostrum long, reaching upto antennular peduncle tip, sigmoidal, distal ⅓ part toothless, tip sharply pointed, armed with 7-9+1 dorsal teeth; epigastric tooth conspicuously separated from penultimate tooth; post-rostral carina ending almost nearby posterior margin of carapace; adrostral carina and groove extend beyond epigastric tooth; branchiocrdiac carina weakly, not reaching upto hepatic spine; branchiocardiac groove distinct, postocular groove oblique; cervical groove shallow, hepatic groove and hepatic carina slope downwards and anteroventrally but above pterygostomian angle; hepatic spine and antennular spine small; antennal carina short; antennular flagella subequal, ventral one longer; chelate pereiopod weak, spine not present on ischium of P1; in adult male, basial spine present on P3 with a long barb projecting beyond slender merus; merus of P5 with two triangular teeth; in adult female coxa and basis of P5 reduced; in male disto-median projection of median lobe of petasma with a short filament on ventral and another on dorsal surface; distolateral projections directed forward; anterior part of petasma looks like a flowering bud; in female anterior plate of thelycum on thirteenth sternite, tongue-like and grooved longitudinally, posterior region narrow than anterior, posterior region of anterior plate partially encapsulated in a horse-shoe-like process formed by lateral plate on fourteenth sternite; thelycum in impregnated females covered by a pair of white triangular associate pad; telson armed with only a row of small lateral spine.

Coloration- The entire body is a pale yellow to brownish with red with brownish or greenish specks. The antennae are red with flagella, and pereiopods and pleopods are white to pinkish. Uropods are grey-brownish, and the distal part is dark.

Zonation and Habitat- This species has been collected from trawl catch, depth of 2 to 15 m.

Distribution- This species is previously reported from Sri Lanka, Malaysia, Thailand, Indonesia, the Philippines, and New Guinea (Chanda, 2014).

In India, the species is previously reported from both East and West coast: Maharashtra, Goa, Andhra Pradesh, Karnataka, Kerala, Tamil Nadu, Odisha, and Andaman Island (Chanda, 2014).

Commercial/Ecological Importance- These prawns are used as commercial species.

Figure 3.8 *Metapenaeus dobsoni* (Miers, 1878): Male lateral view. (Scale bare=1 cm).

9. *Metapenaeus kutchensis* George, George & Rao, 1963 (fig. 3.9)

Materials Examined- 1 male and 2 females (TL-7.8 cm, CL-2.5 cm; TL-6.6 cm, CL-2.3 cm; TL- 8.9 cm, CL- 2.7 cm) (ZL-AR-PR-03), Fish landing center, Veraval (22°54'23.35" N 70°22'48.83" E), Gir Somnath District, 16 February 2016, coll. Barkha Purohit. 3 females and 1 male (TL- 15.2 cm, CL-5.9 cm; TL-15.9 cm, CL-6.2 cm; TL-15.7 cm, CL-6.1 cm), Chhachi (22° 57'01.93" N 68° 59'59.74" E) Kachchh District, 18 October 2016, coll. Barkha Purohit. 1 female (TL-4.6 cm, CL-1.5 cm), Bhadreshwar (22°52’04.39” N 69°53’33.05” E), Kachchh District, 02 October 2015, coll. Barkha Purohit. 2 females (TL-4.7 cm, CL-1.47 cm; TL-5.3 cm, CL-1.7 cm),

Kamboi (22° 12'58.53" N 72° 36'53.85" E), Bharuch District, 02 October 2017, coll. Barkha Purohit.

Diagnosis- Entire body irregularly pubescent; rostrum armed with 7-9 dorsal teeth, straight with a small crest, reaching beyond distal end of antennular peduncle in females, slightly falling short in male; epigastric spine conspicuously separated from penultimate tooth; adrostral carina ending between epigastric and penultimate spines, adrostral groove ends behind epigastric spine; post-rostral carina ending before posterior margin of carapace; antennal and hepatic spines present, strong; postocular groove oblique, orbital spine bluntly pointed, orbitoantennal groove distinct meeting the hepatic groove below hepatic spine; hepatic groove descend vertically, distal portion curves anteroventrally towards pterygostamian angle; cervical groove obliquely straight behind hepatic spine; branchiocardiac groove prominent, branchiocardiac carina meeting with hepatic spine; antennular flagella equal, stylocerite extending upto half basal segment; first two abdominal segments terga clear and last three abdominal segments sharp; carina of sixth abdominal segment ends with an acute spine; ischium of P5 with a spine, smaller than basial spine; merus of P5 of adult male with a shallow notch followed by an anterior minute tooth; dorsal carina conspicuous only from fourth to sixth somite and terminate in a short spine; in male disto-median lobes bifid and more transversely placed with proximal end narrow and distal end broad; in female anterior plate of thelycum tongue shaped, posteriorly wider, median groove widens posteriorly; posterior plate on sternite fourteenth concave, glabrous transversely cut into two unequal segments; lateral edges of these segments upcurved and placed one behind other; telson tapered into a sharp point, grooved dorsally with very minute numerous dorsolateral spine.

Coloration- *The f*resh specimens are reddish-orange like a carrot shade. It is less glabrous and more tomentose. Pubescence present in a shallow groove and irregular patches present on the carapace and abdomen. The patches are thick on the epimera of the abdominal segments.

Zonation and Habitat- This species has been collected from trawl catch, depth of 2 to 15 m.

Distribution- In India, the species is previously reported from the Northwest coast: Gujarat and Maharashtra (Radhakrishnan et al., 2011).

Commercial/Ecological Importance: This species is used as a commercial species. Little Run of Kachchh is the primary fishing ground.

Figure 3.9 *Metapenaeus kutchensis* George, George & Rao, 1963: Female lateral view. (Scale bare=1 cm).

10. *Metapenaeus monoceros* (Fabricius, 1798) (fig. 3.10)

Metapenaeus cognatus Nobili, 1904: 228-238.
Metapenaeus *deschampsi* Nobili, 1903: 1-24, plt. 1.
Penaeopsis spinulicauda Stebbing, 1914: 1-55; plts. 1-12
Penaeus monoceros Fabricius, 1798: 1-572.

Materials Examined- 1 male and 1 female (TL-10.2 cm, CL-4.8 cm; TL-12.5 cm, CL-5.1 cm) (ZL-AR-PR-08), Fish landing center, Veraval (22°54'23.35" N 70°22'48.83" E), Gir Somnath District, 16 February 2016, coll. Barkha Purohit. 1 female and 1 male (TL-13.5 cm, CL-5.5 cm; TL-13.7 cm, CL-5.4 cm), Sartanpar (22° 57'01.93" N 68° 59'59.74" E), Bhavnagar District, 18 October 2016, coll. Barkha Purohit. 1 male and 1 female (TL-8.7 cm, CL-3.2 cm; TL-10.2 cm, CL- 3.8 cm), Fish landing center, Jakhau (23° 14'05.87" N 68° 36'37.32" E), Kachchh District, 29 April 2016, coll. Barkha Purohit. 1

female (TL-11.7 cm, CL-4.9 cm), Odadar (21°34’10.92” N 69°40’05.06" E), Porbandar District, 27 April 2016, coll. Barkha Purohit.

Diagnosis- Body covered with stiff, very short tomentum; carapace and abdomen irregularly pubescent; rostrum straight, extend upto tip of antennular peduncle, tip up tilted, armed with 8-10 dorsal teeth; epigastric tooth conspicuously separated from penultimate tooth; post rostral carina reaching upto posterior margin of carapace; adrostral carina ending behind second rostral tooth and groove behind epigastric spine; hepatic and antennal spine prominent, orbital angle blunt, cervical groove ascends obliquely after hepatic spine, hepatic groove descending vertically downward, turning anteroventrally towards the pterygostomian angle, pterygostomian angle without spine; branchiocardiac carina prominent, reaching upto hepatic spine; a small ischial spine present on P1; in male merus of P5 with a proximal notch followed by a long, inwardly curved spine and a row of tubercles; in male disto-median projection of median lobe of petasma convoluted, swollen, bulbiform, directed anterolaterally, tip of the projections trifurcated curling in a rounded form, concealing distolateral projections in ventral view; in female anterior plate of thelycum narrow, tongue-like, ventrally grooved; posterior plate on fourteenth sternite deeply notched anteriorly, lateral margins raised longitudinally into a cuplike structure; telson armed with minute spines on lateral margin.

Coloration- The entire body is pink, green, or greyish with brown specks. The distal part of uropods is purple-blue, and the telson is dark grey.

Zonation and Habitat- This species has been collected from trawl catch, depth up to 20 m.

Distribution- This species is distributed along the Eastern Mediterranean Sea, Red Sea, East Coast of South Africa, Mozambique, Madagascar, Reunion Island, Mauritius, Saudi Arabia, Pakistan, Sri Lanka, Myanmar, Malaysia, and Indonesia (Chanda, 2014).

In India, the species is previously reported from both East and West coast: Gujarat, Maharashtra, Goa, Karnataka, Kerala, Tamil Nadu, Andhra Pradesh, Odisha, West Bengal, and Andaman Island (Chanda, 2014).

Commercial/Ecological Importance- This species is commonly used as a food source. Gujarat is the major landing center.

Figure 3.10 *Metapenaeus monoceros* (Fabricius, 1798): Female lateral view. (Scale bare=1 cm).

11. *Metapenaeus moyebi* (Kishinouye, 1896) (fig. 3.11)

Metapenaeus burkenroadi Kubo, 1954: 89-93; Geogre, 1969: 5-48
Penaeus moyebi Kishinouye, 1896: 372-374

Materials Examined- 2 females and 2 males (TL- 9.8 cm, CL-3.5 cm; TL-9.4 cm, CL-3.6 cm; TL-9.7 cm, CL-3.6 cm; TL-9.6 cm, CL-3.8 cm) (ZL-AR-PR-09), Subhash Nagar landing center (21°38'24.45" N 69°35'44.19" E), Porbandar District, 08 February 2017, coll. Barkha Purohit. 1 male and 1 female (TL-9.1 cm, CL-3.2 cm; TL-9.6 cm, CL-3.4 cm), Hazira fish market (21°14'16.42" N 72°49'08.88" E), Surat District, 3 November 2018, coll. Barkha Purohit and Rashmi Pal.

Diagnosis- Entire body pubescent; rostrum long, straight and slightly uplifted, armed with 7-10 dorsal teeth, reaching up to the last segment of antennule peduncle; epigastric tooth separated from others; post rostral carina ending near posterior margin of carapace; adrostral carina not exceeding beyond epigastric tooth, adrostral groove extends little beyond epigastric tooth; orbital angle blunt; antennal and hepatic spine prominent; cervical groove prominent, hepatic groove descends vertically, turn

towards pterygostomian angle; branchiocardiac carina feeble defined, occupy posterior ⅓ of carapace; ischial spine on P1 minute; in male merus of P5 with a proximal notch followed by a twisted keeled tubercle; in male disto-median projection of median lobe of petasma laminose, diverging anteriorly; distolateral projection of lateral lobe broad blunt and directed anterolaterally; in female anterior plate of thelycum on sternite thirteenth flask-shaped, anterior margin of it slightly convex, with three subequal size tubercles; lateral plates kidney-shaped, often with angular contour; telson armed with minute lateral row of spine on both side.

Coloration- The whole body is semi-translucent, somewhat pale green, and covered with dense dark brown dots. Eyes are black-brown and antennal flagella reddish. All pairs of pleopods are slightly pinkish, and the distal part of uropods is somewhat yellowish green and with reddish-brown margins.

Zonation and Habitat- This species has been collected from trawl catch, depth of 10 to 15 m.

Distribution- This species is previously reported from Sri Lanka, Malaysia, Borneo, Thailand, China, Philippines, Taiwan, and Japan (Chanda, 2014).

In India, the species is previously reported from both East and West coast: Goa, Andhra Pradesh, Kerala, and Tamil Nadu (Chanda, 2014).

Commercial/Ecological Importance- This species has fisheries potential. They are used as a food source.

Figure 3.11 *Metapenaeus moyebi* (Kishinouye, 1896): Male lateral view. (Scale bare=1 cm).

Genus *Mierspenaeopsis* Sakai & Shinomiya, 2011

Helleropenaeopsis Chanda, 2016: 5-7.

Diagnosis- Disto-median projection of petasma developed into leaflike shape.

12. *Mierspenaeopsis hardwickii* (Miers, 1878) (fig. 3.12)

Parapenaeopsis cultirostris Alcock, 1906: 1-57, plts. 1-9.
Penaeus hardwickii Miers, 1878: 298-310.
Helleropenaeopsis hardwickii (Chanda), 2016: 5-6.

Materials Examined - 1 male and 1 female (TL-10.1 cm, CL-4.5 cm; TL-11.2 cm, CL-4.8 cm) (ZL-AR-PR-08), Subhash Nagar landing center (21°38'24.45" N 69°35'44.19" E), Porbandar District, 08 February 2017, coll. Barkha Purohit. 1 female and 1 male (TL-11 cm, CL-3.1 cm; TL-9.5 cm, CL-4.2 cm), Tithal (20° 36'02.22" N 72° 53'32.16" E), 27 October 2017, coll. Barkha Purohit and Rashmi Pal. 2 females (TL-11.5 cm, CL-5.1 cm; TL-11 cm, CL- 4.8 cm), Fish landing center, Jakhau (23° 14'05.87" N 68° 36'37.32" E), Kachchh District, 29 April 2016, coll. Barkha Purohit. 1 female and 2

males (TL- 11.9 cm, CL-5.0 cm; TL-11.3 cm, CL- 4.9 cm; TL-10.2 cm, CL-4.4 cm), Fish landing center, Veraval (22°54'23.35" N 70°22'48.83" E), Gir Somnath District, 16 February 2016, coll. Barkha Purohit.

Diagnosis- Body minutely setose; rostrum sexually dimorphic, with 8-10 dorsal teeth; sigmoidal in female, distal half toothless, upcurved, extending beyond antennular peduncle, in male rostrum slightly down curved, not extending beyond antennular peduncle; adrostral carina ending between epigastric and penultimate rostral tooth, groove below epigastric tooth; epigastric tooth conspicuously separated from penultimate tooth; postrostral carina extending up to posterior border of carapace; orbital spine very minute, hepatic and antennal spine prominent, antennal carina very short, cervical groove distinct, ending below longitudinal suture, hepatic groove slopes anteroventrally towards pterygostomian angle, carina accompanied with groove below the level of hepatic spine, pterygostomian angle rounded, longitudinal suture extend up to gastric region posteriorly, transverse suture at the level of third pereiopod, branchiocardiac carina indistinguishable; dorsal carina on abdominal somite starts from third somite, ends at posterior margin of sixth somite with a sharp spine; three cicatrices present on sixth somite; epipod and basial spine present on P1 and P2, basis of P3 unarmed; in male disto-median projections of median lobe of petasma developed into leaflike shape, as long as broad, just above lateral lobe, anterior margin crenulated, distolateral projection of lateral lobe of petasma with tapering tip below disto-median projection; in female, anterior plate of thelycum concave ventrally, anterior margin rounded, broader than long; posterior plate flat, with a pair of anterolateral tooth like projection, anteromedian margin convex, bearing a transverse row of long hairs; telson armed with 3-5 pairs of lateral movable spine.

Coloration- The body is usually grey and sometimes pink. The rostrum and post-rostral carina are dark greys. All pairs of pereiopods are brownish-pink, and pleopods are pinkish. The telson and uropods are grey and pink, with a dark grey median longitudinal stripe.

Zonation and Habitat- This species has been collected from trawl catch, depth of 10 to 15 m.

Distribution- This species is previously reported from Bangladesh; Pakistan, Malaysia, Singapore, Borneo, Gulf of Tonkin, South China Sea, Taiwan, and Japan (Chanda, 2016).

In India, the species is previously reported from both East and West coast: Gujarat, Maharashtra, Goa, Karnataka, Kerala, and Andhra Pradesh, Odisha (Radhakrishnan et al., 2011; Radhakrishnan et al., 2012).

Commercial/Ecological Importance- This species has fisheries potential. They are commonly used as seafood.

Figure 3.12 *Mierspenaeopsis hardwickii* (Miers, 1878): Female lateral view. (Scale bare=1 cm).

13. *Mierspenaeopsis sculptilis* (Heller, 1862) (fig. 3.13)

Penaeus sculptilis Heller, 1862: 519-528
Helleropenaeosis sculptilis (Chanda), 2016: 6-7, fig. 3.

Materials Examined- 2 females (TL-15 cm, CL-6 cm; TL- 14.7 cm, CL- 5 cm) (ZL-AR-PR-11), Subhash Nagar landing center (21°38'24.45" N 69°35'44.19" E), Porbandar District, 08 February 2017, coll. Barkha Purohit. 1 female (TL-15.2 cm, CL-6.1 cm), Dandi (20° 53'14.18" N 72°

48'19.42" E), Navsari District, 13 December 2017, coll. Barkha Purohit. 2 females and 1 male (TL-10 cm, CL-3.6 cm; TL-10.3 cm, CL- 4 cm; TL-10.4 cm, CL- 3.8 cm), Okha landing center (22°28'46.79" N 69°04'38.40" E), Devbhumi Dwarka District, Gujarat, 2 February 2016, coll. Barkha Purohit. 1 female and 1 male (TL-8.6 cm, CL-3.8 cm; TL-8.4 cm, CL-3.7 cm), Fish landing center, Veraval (22°54'23.35" N 70°22'48.83" E), Gir Somnath District, 16 February 2016, coll. Barkha Purohit. 2 females (TL-9 cm, CL-4 cm; TL-8.8 cm, CL-4.1 cm), Sikka (22°25'52.81" N 69°51'25.74" E), Jamnagar District, 20 December 2016, coll. Barkha Purohit.

Diagnosis- Rostrum armed with 7-9 dorsal teeth, absent on ventral side; sigmoid shaped in female, toothless distal ⅓ to ½, distally upcurved; in male downward, unarmed portion absent; postorbital crest almost extending up to a posterior margin of carapace, weakly grooved or flat; P1 and P2 with epipodal and basal spine; in male disto-median projection of petasma long and rabbit ear-shaped, deeply concave from the ventral side; distolateral projection short, anterolaterally directed; in female anterior plate of thelycum distally rounded and broadly articulating with posterior plate, lateral tubercle bearing long tuft setae; telson unarmed.

Coloration- The body color is pale with wide, dark brown, almost black-transverse bands. The carapace is dark brown dorsally, except for a white band about its middle. The bands on the abdomen are reaching up to the ventrodistal margin. Uropods are yellow to pink, with a very wide, dark brown middle transverse band.

Zonation and Habitat- This species has been collected from trawl catch, depth of 25 to 35 m.

Distribution- This species is previously reported from Pakistan, Myanmar, Malaysia, Indonesia, South China Sea, Hong Kong, Philippines, Taiwan, New Guinea, North Australia (Chanda, 2016).

In India, the species is previously reported from both East and West coast: Gujarat, Maharashtra, Goa, Karnataka, Kerala, Tamil Nadu, Andhra

Pradesh, Odisha, and West Bengal (Radhakrishnan et al., 2011; Radhakrishnan et al., 2012).

Commercial/Ecological Importance- Commonly used as a food source. Gujarat is the major landing center.

Figure 3.13 *Mierspenaeopsis sculptilis* (Heller, 1862): Female lateral view. (Scale bare=1 cm).

Genus *Parapenaeopsis* Alcock, 1901

Diagnosis- Body slender, integument thin; rostrum dorsally armed; postorbital spine not present; petasma symmetrical, variable in shape; median lobes only barely perceptible, moderately developed or produced into conspicuous projections; lateral lobes moderately well sclerotized, distally produced into simple or bilobed oblique or elongate, hornlike projections, variably directed, channeled or tubular, and opening by minute apical apertures; second pleopod biramous, endopod modified proximally into appendix masculina.

14. *Parapenaeopsis stylifera* (H. Milne Edwards, 1837) (fig. 3.14)

Parapenaeopsis coromandelica Alcock, 1906: 1-57, plts.1-9.
Parapenaeopsis stylifera coromandelica Alcock, 1906: 1-57, plts.1-9.
Parapenaeopsis stylifera var. cochinensis M.J. George, 1974: 420-423.
Parapeneopsis stylifera var. cochinensis M.J. George, 1974: 420-423.
Parapeneopsis stylifera var. coromandelica Alcock, 1906: 1-57, plts.1-9.

Penaeus styliferus H. Milne Edwards, 1837: 638, plts. 1–42

Materials examined- 1 male (TL-10.9 cm, CL-4.1 cm) (ZL-AR-PR-04), Subhas Nagar landing center (21°38'24.68" N 69°35'40.77" E), Porbandar District, 11 January 2018, coll. Barkha Purohit. 1 male and 1 female (TL-11.5 cm, CL-4.7 cm TL- 8.9 cm CL-2.8cm); Fish landing center, Veraval (22°54'23.35" N 70°22'48.83" E), Gir Somnath District, 11 February 2017, coll. Barkha Purohit. 2 females and 1 male (TL-7.4 cm, CL-3.0 cm; TL-11.9 cm, CL-4.3; TL-13.2 cm, CL-5.1 cm; TL-15.5 cm; CL-5.2 cm), Okha landing center (22°28'46.79" N 69°04'38.40" E), Devbhumi Dwarka District, 6 May 2016, coll. Barkha Purohit. 2 females (TL-12.2 cm, CL- 5.1 cm; TL- 11 cm, CL- 4.8 cm), Dandi (20° 53'14.18" N 72° 48'19.42" E), Navsari District, 13 December 2017, coll. Barkha Purohit and Rashmi Pal. 1 female (TL-11.1 cm, CL- 4.0 cm), Navlakhi (22° 58'25" N 70° 27'24" E) Rajkot District, 15 December 2016, coll. Barkha Purohit. 1 female (TL-12.5 cm, CL-4.8 cm), Vadinar (22°23’45.58” N 69°42’04.92” E) Devbhumi Dwarka District, 12 May 2017, coll. Barkha Purohit.

Diagnosis- Body slender, minutely setose; rostrum sigmoidal, strongly upcurved, distal half toothless, extending beyond antennular peduncle, armed with 7-9+1 dorsal teeth only, epigastric tooth conspicuously separated from penultimate tooth; postrostral carina reaching posterior border of carapace; adrostral carina indistinguishable; orbital spine very short, antennal and hepatic spine prominent; antennal carina short, cervical groove not marked, hepatic groove prominent accompanied with a carina at anterior half, slops anteroventrally towards sharp pterygostomian angle; longitudinal suture long reaching gastric region posteriorly; branchiocardiac groove absent; transverse suture prominent and situated at the level of P3 on branchial region; dorsal carination prominent from fourth somite and terminating at midposterior border of sixth somite with a short spine, antennular flagella subequal, dorsal one longer than ventral, equal to carapace; epipod and basial spine present on first and second pereiopods, basis of P3 without spine; telson armed with four pairs of lateral fixed spines; disto-median projection of median lobe of

petasma short and curved ventrally; distolateral projections of lateral lobe slender, hornlike, straight, directed anterolaterally and with an opening at ventral side; anterior plate of thelycum square, concave, with a slender stem-like posterior process; lateral plate sub rectangular, fused posteriorly, notched anteromedially.

Coloration- Fresh specimen pale brownish to pinkish-white and sometimes grayish. All pairs of pereiopods and pleopods are yellowish pink to reddish pink. Uropods are dark brown.

Zonation and Habitat- This species has been collected from trawl catch, depth of 20 to 35 m.

Distribution- The species is so far reported from the Northwestern coast of Malaysia and along the western coast of Thailand, Indo-West Pacific from southern India to the Gulf of Thailand, Indonesian Archipelago, and Borneo (Holthius, 1980).

In India, the species is previously reported from both East and West coast: Gujarat, Maharashtra, Goa, Karnataka, Kerala, Tamil Nadu, Andhra Pradesh, Odisha, and West Bengal (Radhakrishnan et al., 2011).

Commercial/Ecological Importance- Commonly used as a food source. Gujarat is the primary landing center. Exported to various countries

Figure 3.14 *Parapenaeopsis stylifera* (H. Milne Edwards, 1837): Female lateral view. (Scale bare=1 cm).

Genus *Parapenaeus* Smith, 1885

Neopenaeopsis Bouvier, 1905: 746-749

Diagnosis: Body glabrous; rostrum armed with dorsal teeth only; epigastric tooth situated at a considerable distance from penultimate tooth; carapace with antennal and hepatic spine; orbital spine pointed; pterygostomian or branchiostegal spine present (absent in *P. longipes* Alcock, 1905); postocular and cervical sulcus not present; hepatic sulcus indistinct; hepatic carina anteriorly well marked; longitudinal suture present, long; transverse suture present, at level of P2; antennule with parapenaeid spine, flagella unequal, sexually dimorphic, longer in male than female; lower one longer in female; sixth abdominal somite without cicatricx; somite thirteen with pleurobranchia and posterior arthrobranchia only; appendix masculina sub-ovoidal; only P1 with basial and ischial spines; telson with fixed spine; all pereiopods (P1 to P5) with minute exopods; petasma symmetrical, semi closed, with numerous processes and folds; dorsomedian lobule bearing one sub-distal process; ventrolateral lobule with two terminal process; thelycum with single plate raised in two pairs of lateral prominence disposed longitudinally; both pairs separated by a median groove; median protuberance of somite thirteen strongly developed, more or less excavate posteromedially.

15. *Parapenaeus fissuroides indicus* Crosnier, 1986 (fig. 3.15)

Materials examined- 2 males and 1 female (TL-8.4 cm, CL- cm; TL-8.9 cm, CL- cm) (ZL-AR-PR-33), Subhas Nagar landing center (21° 38'24.68" N 69° 35'40.77" E), Porbandar District, 10 February 2015, coll. Barkha Purohit.

Diagnosis- Body hairless and smooth; rostrum well developed, armed with 6 to 7 dorsal teeth, ventral teeth absent; eyes well developed; branchiostegal spine present at anterior edge of carapace; longitudinal and transverse suture present on carapace; epigastric spine distinctly behind the hepatic spine; in male (petasma) sub distolateral lobes distinctly bifurcate; telson with two fixed lateral spine.

Coloration- The whole body and appendages are rose color (Dineshbabu, 2004).

Zonation and Habitat- This species has been collected from the trawl catch, a depth of 60 m.

Distribution- The species is so far reported from Kenya, South Africa, Madagascar, and the Gulf of Oman (Dineshbabu, 2004).

In India, the species is previously reported from only the West coast: Mangalore (Dineshbabu, 2004).

Commercial/Ecological Importance- This species has limited commercial importance.

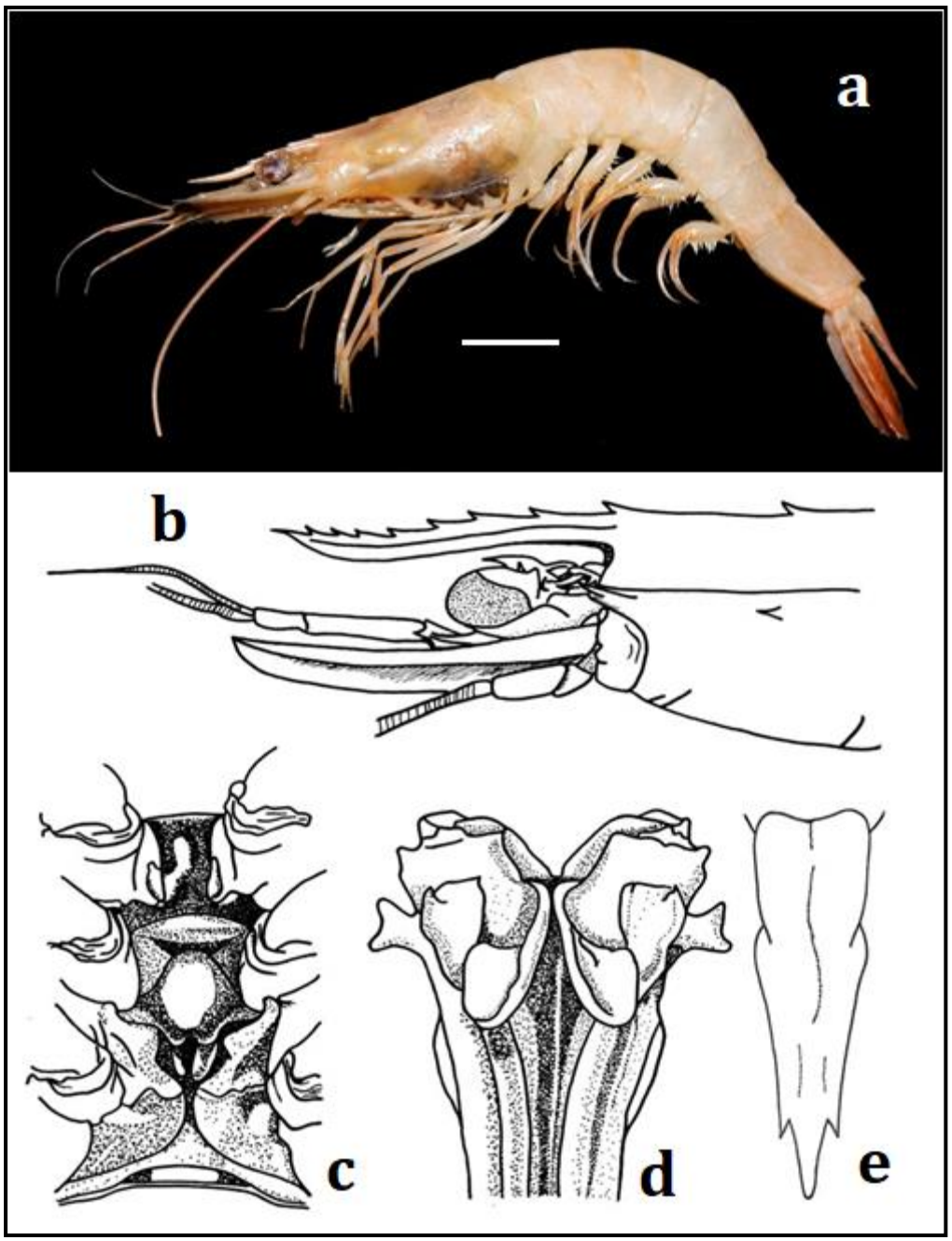

Figure 3.15 *Parapenaeus fissuroides indicus* Crosnier, 1986: Male lateral view; b. Carapace; c. Thelycum; d. Petasma; d. Telson. (Scale bar= 1cm).

16. *Parapenaeus longipes* Alcock, 1905 (fig. 3.16)

Parapeneus longipes Alcock 1905: 525.

Parapenaeus longipes f. denticulata Crosnier, 1986: 303-355.

Materials examined- 2 female and 1 male (TL-6.9 cm, CL-2.9 cm; TL-7.2 cm, CL- 4.4 cm; TL 5.2 cm, CL-2.1 cm) (ZL-AR-PR-32), Subhas Nagar landing

center (21° 38'24.68" N 69° 35'40.77" E), Porbandar District, 10 February 2015, coll. Barkha Purohit.

Diagnosis- Carapace smooth; rostrum reaching up to last antennular segment, slightly curved downward; armed with 5-6 teeth; epigastric teeth present, small; postrostral carina distinct, reaching almost to posterior margin of carapace; branchiostegal spine absent at anteroinferior angle of carapace; antennular flagella unequal; second antennular segment twice as third segment; first four abdominal segments furnished with narrow cross bands of rather light reddish-brown color near posterior border of lateral surface; third abdominal somite with inconspicuous and flat carina; pleura of fourth to sixth abdominal segment sharply carinated along dorsomedial line, carina of each segment ends posteriorly into minute acute spine; 6th abdominal somite about 2.0 times as long as wide posteriorly; petasma with disto-lateral lobes spont-like and as long as distal-median ones; in female anterior plate of thelycum semicircular; articulating to intermediate plate; lateral plate broad, quadrate and continues to posterior plate; telson much shorter than endopods; enopods shorter than exopods; telson with a pair of long spines.

Zonation and Habitat- This species has been collected from trawl catch, depth of 10 to 90 m.

Distribution- The species is distributed along the Indo-West Pacific, Eastern coast of Africa to Japan and New Guinea (Holthius, 1980).

In India, the species is previously reported from both East and West coast: Gujarat (Chakraborty and Thumber, 2005), Karnataka, Kerala, Orissa, Andhra Pradesh (Alcock, 1905).

Commercial/Ecological Importance- This is the most abundant species and of very limited commercial importance.

Figure 3.16. *Parapenaeus longipes* Alcock, 1905: Male lateral view. (Scale bar= 1cm).

Genus *Penaeus* Fabricius, 1798

F*arfantepenaeus* Burukovsky, 1997: 154.

Fenneropenaeus Pérez Farfante, 1969: 461-591.

Litopenaeus Pérez Farfante, 1969: 461-591.

Marsupenaeus Tirmizi, 1971: 193-194.

Melicertus Rafinesque, 1814: 1-55.

Penaeus (Farfantepenaeus) Burukovsky, 1997: 154.

Penaeus (Farfantepenaeus) Burukovsky, 1972: 3-21.

Diagnosis- Rostrum well developed, teeth present on both sides dorsal and ventral; pleurobranchia present on fourteenth somite smooth; three short, sixth abdominal segment with well-defined cicatrices; adro-rostral sulcus and carina short, or reaching up to epigastric tooth; gastrofrontal carina absent; hepatic carina prominent; thelycum closed; petasma with ventral costa, long, reaching distal margin of lateral lobe.

17. *Penaeus canaliculatus* (Olivier, 1811) (fig. 3.17)

Melicertus canaliculatus (Olivier, 1811): 656-670.

Palaemon canaliculatus Olivier, 1811: 656-670.

Materials examined- 2 females and 1 male (TL-6.9 cm, CL-3.6 cm; TL-8.9 cm, CL-4.9 cm; TL-7.2 cm, CL-3.8 cm) (ZL-AR-PR-12), Subhas Nagar landing center(21°38'24.68" N 69°35'40.77" E), Porbandar District, 10 February 2015, coll. Barkha Purohit. 1 female and 1 male (TL-7.2 cm, CL-3.6 cm; TL-

10.2 cm, CL-5.2 cm) Fish landing center, Jakhau (23° 14'05.87" N 68° 36'37.32" E), Kachchh District, 29 April 2016, coll. Barkha Purohit.

Diagnosis- Carapace grooves and crest very distinct, both gastro-frontal and hepatic crests present on carapace; rostrum armed 10-11 dorsal and one ventral tooth, adrostral groove extending up to posterior margin of carapace; postrostral crest well developed with a deep median groove throughout its length; ischium spine absent on P1; thelycum of females formed by two sub-rectangular lateral plates, with their anterolateral angles diverging; anterior process sub-oval, posterior process somewhat triangular; very short disto-median projection present in petasma; telson without a lateral spine.

Coloration- Fresh specimen pale yellow with crossed dark brown transverse bands and eyes are dark brown. The antennal scales are greenish with white tips, and the flagella are yellowish. All pairs of pereiopods are yellowish to whitish, and the pleopods yellowish to reddish and with brown and white spots at the bases. The distal part of the uropods with a bright yellow patch.

Zonation and Habitat- This species has been collected from trawl catch, depth of 2 to 50 m.

Distribution- The species widely distributed in the Indo-West Pacific, from the eastern coast of Africa to the Red Sea, Taiwan, China, Okinawa, and Polynesia (Holthius, 1980).

In India, the species is previously reported from both East and West coast: Gujarat, Kerala, Maharashtra, Tamil Nadu, Odisha, West Bengal, and Andaman and Nicobar Island (Radhakrishnan et al., 2011).

Commercial/Ecological Importance- This species is commonly used as a food source.

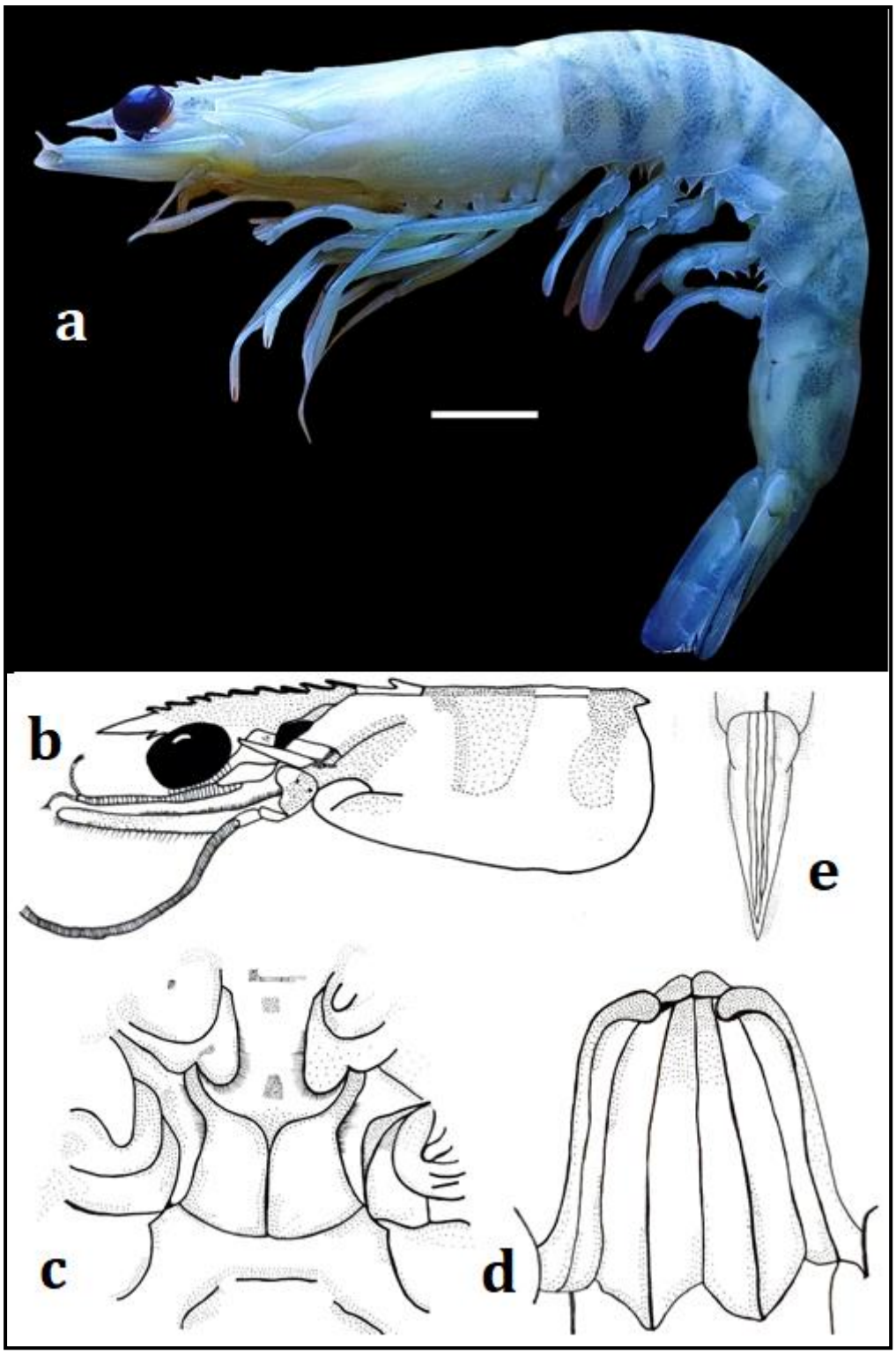

Figure 3.17 *Penaeus canaliculatus* (Olivier, 1811): a. Male lateral view; b. Carapace; c. Thelycum; d. Petasma. (Scale bar=1 cm).

18. *Penaeus indicus* H. Milne Edwards, 1837 (fig. 3.18)

Penaeus indicus H. Milne Edwards, 1837: 638, plts. 1–42

Palaemon longicornis Olivier, 1811: 656-670.

Penaeus indicus longirostris De Man, 1892: 265-527; plts. 15-29.

Materials Examined- 1 male (TL-12.1 cm, CL-4.6 cm) (ZL-AR-PR-13), Subhas Nagar landing center (21°38'24.68" N 69°35'40.77" E), Porbandar District, 11 January 2018, coll. Barkha Purohit. 1 male and 1 female (TL-11.2 cm, CL-4.1 cm TL- 13.7 cm CL-4.8 cm); Fish landing center, Veraval (22°54'23.35" N 70°22'48.83" E), Gir Somnath District, 11 February 2017, coll. Barkha Purohit. 1 female and 1 male (TL-11.9 cm, CL-4.3; TL-11.5 cm, CL-4.2 cm), Dhamlej (20°46'36.15" N 70°36'36.12" E), Junagadh District, 14 February 2017, coll. Barkha Purohit. 1 female (TL-12.3 cm, CL-4.6 cm), Kodinar (20°45'29.35" N 70°40'22.82" E), Gir Somnath District, 15 February 2017, coll. Barkha Purohit.

Diagnosis- Carapace and abdomen, smooth; rostrum sigmoidal and tip curved, double curved beyond antennule peduncle; rostrum armed 7-9 dorsal teeth and 3-6 ventral teeth; epigastric tooth present; rostral crest slightly elevated in large specimen; postrostral carina extending near to posterior margin of carapace; gastro-orbital crest distinct, extending over posterior 3/5 to 2/3 of distance between hepatic spine and orbital margin; in adult males, distal segment of Mxp3 longer than second segment, tip bearing dense, long hairs; in males, petasma with disto-median projections strongly curved and overhanging distal margin of costae; thelycum formed by two semicircular lateral plates, median margins forming tumid lips; anterior process slightly rounded and convex; posterior process elongated and inserted between anterior portion of lateral plates; anterior and posterior processes rather distinct; telson lacking lateral spines.

Coloration- Body semi-translucent, somewhat yellowish-white or grayish-green and covered with numerous minute dark brown dots; rostral and abdominal dorsal carina reddish brown to dark brown; antennal flagella yellowish; antennular flagella of the same color as the body and covered with many dark spots; legs translucent and somewhat whitish, pleopods yellowish to pinkish; uropods distal part yellowish with red margins.

Zonation and Habitat- This species has been collected from trawl catch, depth of 5 to 90 m.

Distribution- This species is widely distributed in the Indo-West Pacific from the eastern coast of Africa to the Red Sea, Japan, and Australia (Holthius, 1980).

In India, the species is previously reported from both East and West coast: Gujarat, Kerala, Goa, Karnataka, Lakshadweep Island, Tamil Nadu, Andhra Pradesh, Odisha, West Bengal, and Andaman and Nicobar Island (Radhakrishnan et al., 2011).

Commercial/Ecological importance- Commonly used as a food source. Gujarat is the major landing center.

Figure 3.18 *Penaeus indicus* H. Milne Edwards, 1837: Female lateral view. (Scale bar=1 cm).

19. *Penaeus japonicus* Spence Bate, 1888 (fig. 1.19)

Marsupenaeus japonicas (Spence Bate, 1888): 1- 90, plts. 1-150

Penaeus canaliculatus japonicas Spence Bate, 1888: 1- 90, plts. 1-150

Materials Examined- 1 female (TL-12.8 cm, CL-3.2 cm) (ZL-AR-PR-55), Subhas Nagar landing center (21°38'24.68" N 69°35'40.77" E), Porbandar District, 11 January 2018, coll. Barkha Purohit. 1 male and 1 female (TL-13.7 cm, CL-5.2 cm TL-16.0 cm CL-6.2 cm); Fish landing center, Veraval (22°54'23.35" N 70°22'48.83" E), Gir Somnath District, 11 February 2017, coll. Barkha Purohit. 2 females (TL-11.1 cm, CL- 4.04; TL-20.5 cm, CL-5.3 cm), Okha landing center (22°28'46.79" N 69°04'38.40" E), Devbhumi Dwarka District, Gujarat, 6 May 2016, coll. Barkha Purohit. 1 female (TL-15.8 cm, CL-6.2 cm), Mundra (22°50’26.28” N 69°43’10.20” E), Kachchh District, Gujarat, 20 March 2016, coll. Barkha Purohit.

Diagnosis- Carapace smooth, bearing gastro- frontal and hepatic carina, horizontal to base of antennal carina; rostrum armed with 9-11 dorsal teeth and one ventral tooth; adrostral groove extending near to posterior margin of carapace; telson with three paired of movable lateral spines; thelycum forms well-developed pouch, with double tubes opening anteriorly; petasma with long disto-median projections overhanging distal margin of costae.

Coloration- The whole body is pale yellowish and crossed with dark brown transverse bands. The carapace generally extends to the lower half of the carapace, last abdominal band is interrupted. Their eyes are dark brown. Antennal scales are somewhat greenish with white tips, and flagella yellowish. All pairs of pereiopods are whitish to yellowish. The pleopods are yellowish to reddish (in large specimens) and with brown or white spots at the bases. The distal part of the uropod with a bright-yellow patch, followed by another patch of bright blue, and with the red margins.

Zonation and Habitat- This species has been collected from trawl catch, depth of 5 to 50 m.

Distribution- This species is distributed in Widely distributed in the Indo-West Pacific from the eastern coast of Africa to the Red Sea, Japan, Australia, Fiji, and Eastern Mediterranean to the Suez Canal (Holthius, 1980).

In India, the species is previously reported from both East and West coast of India: Gujarat, Maharashtra, Tamil Nadu, and West Bengal (Radhakrishnan et al., 2011).

Commercial/Ecological Importance- This species has commercial importance. Consumed locally and exported.

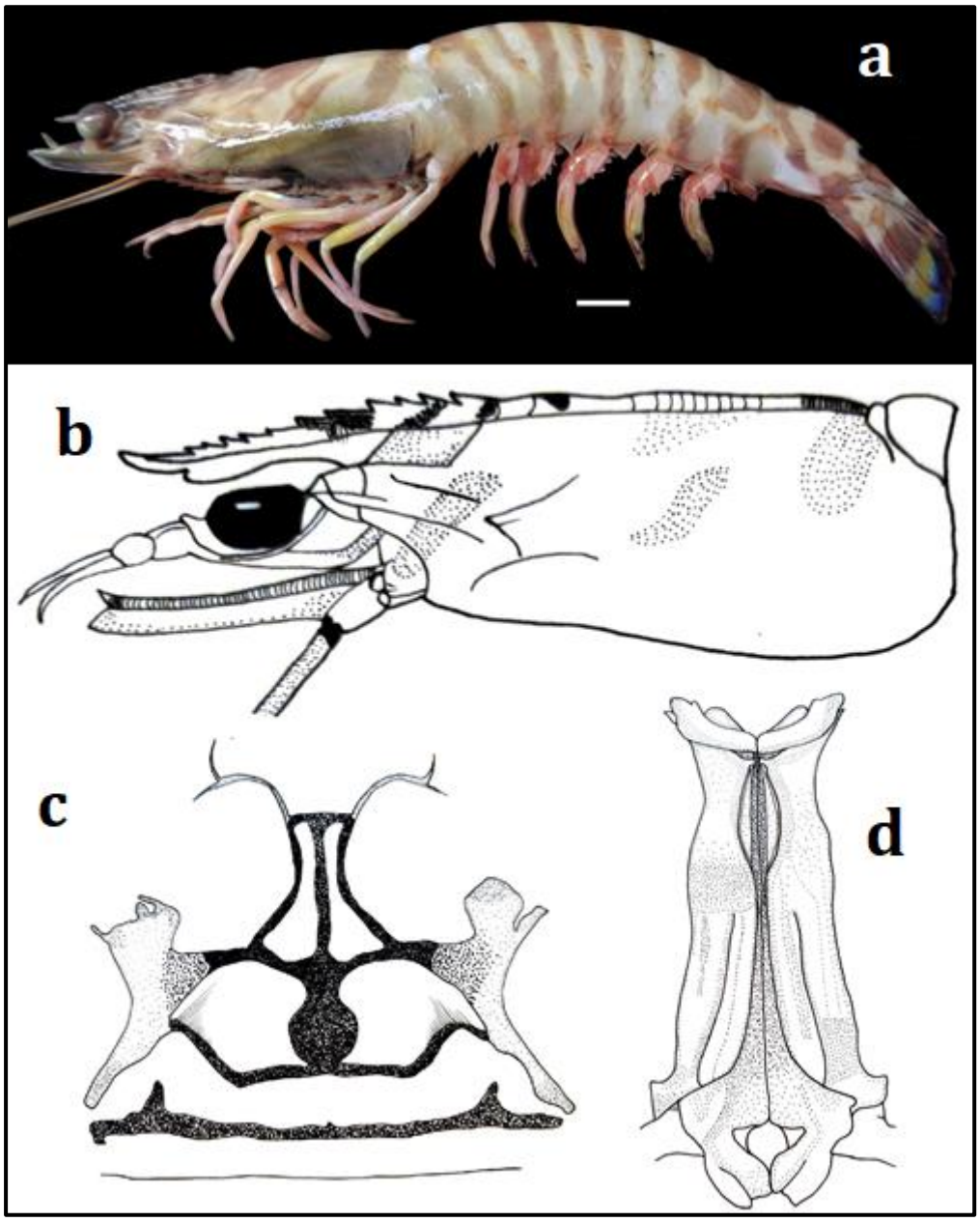

Figure 3.19 *Penaeus japonicus* Spence Bate, 1888: a. Female lateral view; b. Carapace; c. Thelycum; d. Petasma. (Scale bar=1 cm).

20. *Penaeus latisulcatus* Kishinouye, 1896 (fig. 3.20)

Melicertus latisulcatus Kishinouye, 1896:
Penaeus latisulcatus Kishinouye, 1900: 12. de Man, 1911: 108-111. Kubo, 1949: 278-282. Racek, 1955: 222-223; 1959: 10-11. Hall, 1956: 72; 1962: 14-15. Dall, 1957: 149-151. Cheung, 1960: 64. Joubert, 1965: 17-18. Racek and Dall, 1965: 12-13. De Bruin, 1965: 74-75. Mohamed 1969: 29. George, 1969: 22.
Peneus latisulcatus Schmitt, 1926: 365-367.
Penaeus canaliculatus Olivo var? Lanchester, 1901: 571.
Penaeus canaliculatus var. *australiensis* de Man, 1902: 905.

Materials Examined- 1 male (TL-10.6 cm, CL-4.03 cm) (ZL-AR-PR-15), Subhas Nagar landing center (21°38'24.68" N 69°35'40.77" E), Porbandar District, 11 January 2018, coll. Barkha Purohit. 1 female (TL-10.4 cm CL-4.21cm; TL-9.44 cm, CL-3.8 cm), Fish landing center, Veraval (22°54'23.35" N 70°22'48.83" E), Gir Somnath District, 11 February 2017, coll. Barkha Purohit. 1 male and 1 female (TL-12.5 cm, CL-4.7 cm; TL-9.2 cm, CL-3.6), Okha landing center (22°28'46.79" N 69°04'38.40" E), Devbhumi Dwarka District, Gujarat, 6 May 2016, coll. Barkha Purohit.

Diagnosis- Carapace smooth, gastro-frontal and hepatic carinas present; rostrum armed 10-11 dorsal teeth and one ventral tooth; lacking distinct accessory carina on blade; adro-rostral groove extending up to posterior margin of carapace; thelycum anterior process hornlike and strongly bifurcate, posterior process triangular; petasma of males with short disto-median projections slightly overhanging distal margin of costae; three pair of movable spine present on telson.

Coloration- The whole body is yellowish-green and slightly red in large adults. A short vertical black bar is present on each abdominal pleura, and two black stripes are present on the postero-lateral part of the carapace. Uropods are bright yellow, and the distal half and outer margin of exopods are bright blue.

Zonation and Habitat- This species has been collected from trawl catch, depth of 5 to 45 m.

Distribution- This species is distributed along the Widely distributed in the Indo-West Pacific and reported Africa's eastern coast to the Red Sea, Japan, Australia, and Fiji (Holthius, 1980).

In India, the species is previously known from both East and West coast: Gujarat, Kerala, Lakshadweep Island, Tamil Nadu, Andaman, and Nicobar Island (Radhakrishnan et al., 2011).

Commercial/Ecological Importance- This species has commercial importance.

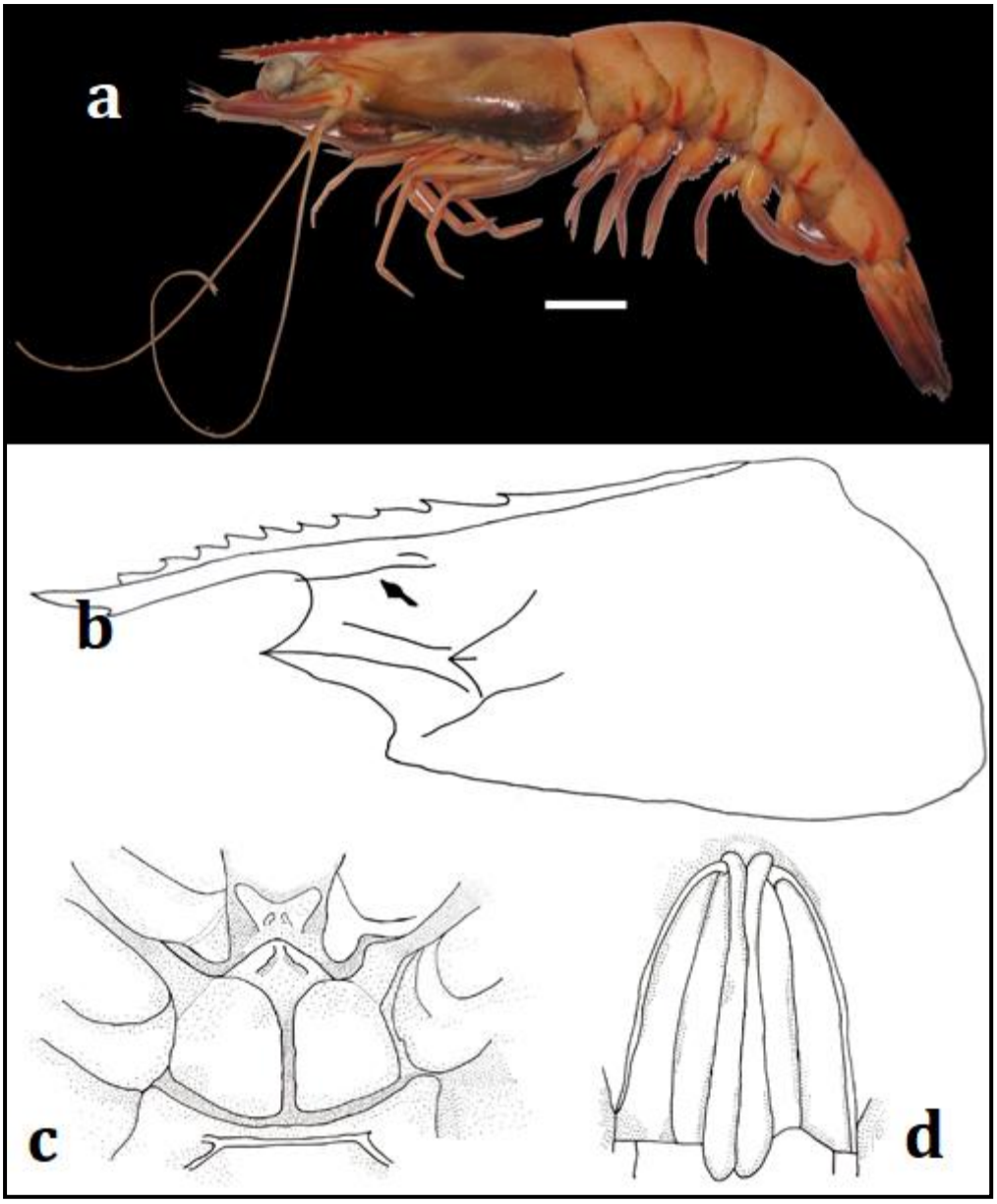

Figure 3.20 *Penaeus latisulcatus* Kishinouye, 1896: a. Male lateral view; b. Carapace; c. Thelycum; d. Petasma. (Scale bar=1 cm).

21. *Penaeus merguiensis* de Man, 1888 (fig. 3.21)

Fenneropenaeus merguiensis (de Man, 1888)
Penaeus indicus var merguiensis de Man 1892: 511.

Materials Examined- 1 male (TL-12.6 cm, CL-5.1 cm) (ZL-AR-PR-15), Subhas Nagar landing center (21°38'24.68" N 69°35'40.77" E), Porbandar District, 11 January 2018, coll. Barkha Purohit. 1 male and 1 female (TL-11.9 cm CL-4.9 cm; TL-12.7 cm, CL-5.4 cm); Fish landing center, Veraval

(22°54'23.35" N 70°22'48.83" E), Gir Somnath District, 11 February 2017, coll. Barkha Purohit. 2 males and 1 female (TL-13.9 cm CL-4.7 cm; TL- 12.9 cm, CL-4.8 cm; TL-13.5 cm, CL- 5.6 cm), Okha landing center (22°28'46.79" N 69°04'38.40" E), Devbhumi Dwarka District, Gujarat, 6 May 2016, coll. Barkha Purohit.

Diagnosis- Carapace smooth, lacking gastro-frontal and hepatic carinas; adrostral carina extending too just before, epigastric tooth; tip of rostrum horizontally straight, rostral carina very high and broadly triangular in large specimens (in females); rostrum bearing 6 to 9 upper teeth and 3 to 5 lower teeth; postrostral carina extending near to posterior portion of carapace; gastro-orbital carina varying from distinct to nearly absent; extending over middle third to posterior 2/3 of the distance between hepatic spine and orbital margin; in adult males, Mxp3 with distal segment only about half as long as second segment, tip bearing tuft of dense short hairs (slightly shorter than distal segment); petasma of males with disto-median projections short, not reaching distal margin of costae; thelycum of females formed by two semicircular lateral plates, with their median margins forming tumid lips; anterior process slightly rounded and concave, obscured by hairs; posterior process elongated and inserted between anterior part of lateral plates; telson lacking lateral spines.

Coloration- The whole body is semi-translucent, somewhat yellowish (in small) to greenish (in large), and covered with numerous minute dark brown dots. Rostral and abdominal dorsal carinas are reddish-brown to dark brown. The antennal flagella are reddish-brown. All pairs of pleopods are pinkish to reddish in color and the distal part of uropods yellowish green with red margins.

Zonation and Habitat- This species has been collected from trawl catch, depth of 10 to 40 m.

Distribution- This species is distributed along the Indo-West Pacific Ocean, from the Persian Gulf and the Arabian Sea to New Guinea, Australia, New Caledonia, and Fiji (Pérez Farfante and Kensley, 1997).

In India, the species is previously reported from both East and West coast: Gujarat, Maharashtra, Odisha, and West Bengal (Radhakrishnan et al., 2012).

Commercial/Ecological Importance- The species is one of the commercially important species.

Figure 3.21 *Penaeus merguiensis* de Man, 1888: Male lateral view. (Scale bar=1 cm).

22. *Penaeus monodon* Fabricius, 1798 (fig. 3.22)

Penaeus bubulus Kubo, 1949: 1-467.
Penaeus carinatus Dana, 1852:10-28.
Penaeus coeruleus Stebbing, 1905: 21-123, plts. 17-26.
Penaeus durbani Stebbing, 1917: 435-450. plts.22-23.
Penaeus semisulcatus exsulcatus Hilgendorf, 1879: 782-851, plts. 1-4
Penaeus tahitensis Heller, 1862: 519-528.

Materials Examined- 1 male (TL-22.7 cm, CL-8.9 cm) (ZL-AR-PR-16), Subhas Nagar landing center (21°38'24.68" N 69°35'40.77" E), Porbandar District, 11 January 2018, coll. Barkha Purohit. 2 males (TL-20.01 cm CL-8.5 cm; TL-17.3 cm, CL-5.2 cm); Fish landing center, Veraval (22°54'23.35" N 70°22'48.83" E), Gir Somnath District, 11 February 2017, coll. Barkha Purohit 1 female (TL-23.05 cm, CL-6.1 cm), Okha landing center (22°28'46.79" N 69°04'38.40" E), Devbhumi Dwarka District, Gujarat, 6

May 2016, coll. Barkha Purohit. 2 males (TL-22.83 cm, CL-7.4 cm; TL- 20.09 cm, CL-8.47 cm), Mithapur (22°25'12.15" N 68°59'32.52" E), Devbhumi Dwarka District, Gujarat, 6 May 2016, coll. Barkha Purohit.

Diagnosis- Carapace and abdomen, uniformly smooth, glabrous (fig. 3.22a); rostrum generally armed with 6-8 dorsal teeth and three ventral teeth; carapace with grooves and carinas distinct**;** postrostral carina well developed and reaching nearly to posterior margin of carapace, with or without a median groove; adrostral carina extending to just before last postrostral tooth; gastrofrontal carina absent; hepatic carina almost horizontal and extending far behind antennal carina (fig. 3.22b); P5 without exopod; petasma of males with disto-median projections slightly overhanging distal margin of costae (fig. 3.22d); thelycum of females formed by two sub-oval lateral plates with tumid lips; anterior process concave and rounded distally; posterior process subtriangular and partly inserted between lateral plates (fig. 3.22c); telson without lateral spines.

Coloration- Fresh specimens are generally grayish greenish or dark greenish-blue. The carapace is covered with mud-yellow transverse bands and the abdomen with dark brown and mud-yellow cross bands. The eyes are light brown, and the antennal flagella are greenish-brown. All pairs of pleopods are reddish or pale red, with bases bright yellow and blue. The distal half portion of the uropods is dark blue or dark brown.

Zonation and Habitat- This species has been collected from trawl catch, depth of 30 to 70 m.

Distribution- This species is widely distributed in the Indo-West Pacific from the eastern coast of Africa to the Red Sea, Japan, Australia, and Fiji (Holthius, 1980).

In India, the species is previously reported from both East and West coast: Gujarat, Maharashtra, Odisha, and West Bengal (Radhakrishnan et al., 2012).

Commercial/Ecological Importance: This species supports major and minor fisheries throughout India, but as it is a large species that has a good market value. It is commercially fished in India.

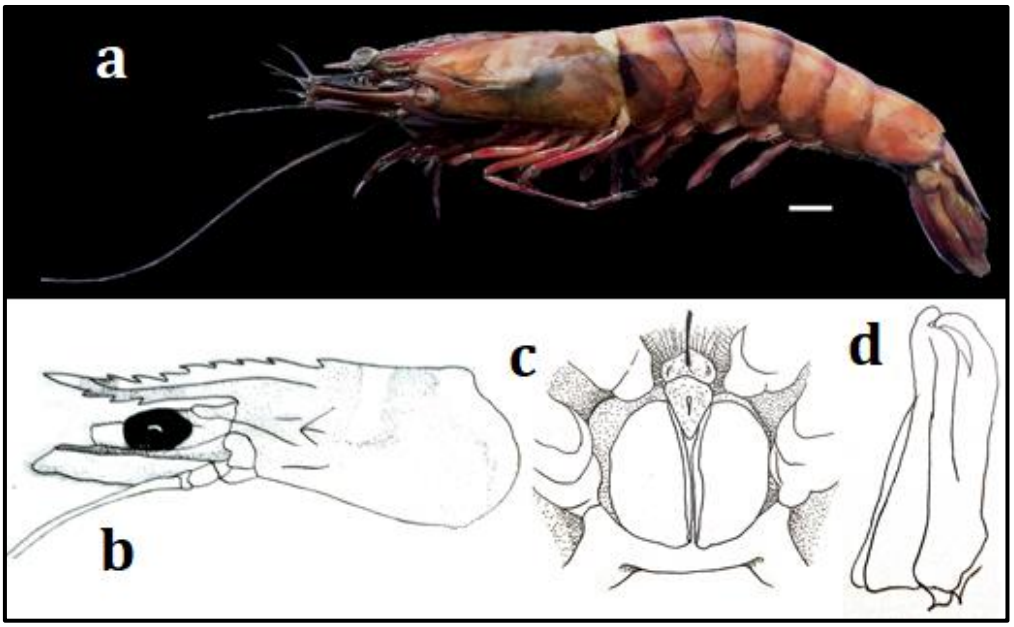

Figure 3.22 *Penaeus monodon* Fabricius, 1798: a. Female lateral view; b. Carapace; c. Thelycum; d. Petasma. (Scale bar=1 cm).

23. *Penaeus penicillatus* Alcock, 1905 (fig. 3.23)

Penaeus indicus penicillatus Alcock, 1905: 508-532.
Fenneropenaeus penicillatus (Alcock, 1905)

Materials Examined- 4 males (TL-18 cm, CL-5.6 cm; TL-18.6 cm, CL-5.8 cm; TL-16. 7cm, CL-5.3 cm; TL-17.5 cm, CL-5.4 cm) (ZL-AR-PR-17), Subhas Nagar landing center (21°38'24.68" N 69°35'40.77" E), Porbandar District, 11 January 2018, coll. Barkha Purohit. 2 males (TL-16.2 cm CL-5.8 cm; TL-16.5 cm, CL-5.2 cm); Fish landing center, Veraval (22°54'23.35" N 70°22'48.83" E), Gir Somnath District, 11 February 2017, coll. Barkha Purohit. 2 males and 4 females (TL-18.2 cm CL-5.6 cm; TL-18.4 cm, CL-5.9 cm; TL-23.2 cm, CL-6.7 cm; TL-19.6 cm, CL-5.8 cm; TL-18.2 cm, CL-5.3 cm; TL-16.3 cm, CL-5.3 cm), Okha landing center (22°28'46.79" N 69°04'38.40" E), Devbhumi Dwarka District, Gujarat, 6 May 2016, coll. Barkha Purohit.

Diagnosis- Carapace smooth, lacking hepatic carinas and gastro-frontal; adrostral carina extending just beyond epigastric tooth; tip of rostrum horizontally straight and rostral carina generally slightly elevated in males, to moderately high in large females; 7 to 9 teeth armed on dorsal side and 3 to 5 on ventral side; postrostral carina extending near to posterior margin of carapace; gastro-orbital carina distinct, occupying 1/2 to ⅓ the distance between hepatic spine and orbital margin, in adult males, 3rd maxilliped with distal segment much longer than second segment which bears a tuft of dense long hairs (as long as distal segment) at tip; petasma of males with disto-median projections slightly bent and not reaching distal margin of costae; in female, thelycum formed by two semicircular lateral plates, with their median margins as tumid lips; anterior process slightly rounded and obscured by hairs; posterior process elongated and inserted between anterior part of lateral plates; telson lacking lateral spines.

Coloration- Body semi-translucent, slightly greenish, and covered with several minute dark brown dots. Eyes are light brown and covered with some dark brown mesh-like stripes. The rostral and abdominal dorsal carinas are reddish-brown to dark brown. Antennal flagella are reddish-brown. The antennular flagella are of the same color as the body and covered with many dark spots. All pairs of pereiopods are translucent and somewhat whitish. Pleopods are rather reddish, and the distal half of uropods yellowish to greenish with reddish tips.

Zonation and Habitat- This species has been collected from trawl catch, depth of 2 to 90 m.

Distribution- This species is distributed along the Indo-West Pacific Ocean from Pakistan to Taiwan, China, and Indonesia (Holthius, 1980).

In India, the species is previously reported from both East and West coast: Gujarat, Maharashtra, Odisha, and West Bengal (Radhakrishnan et al., 2012).

Commercial/Ecological Importance- Commonly used as a food source. Gujarat is the major landing center.

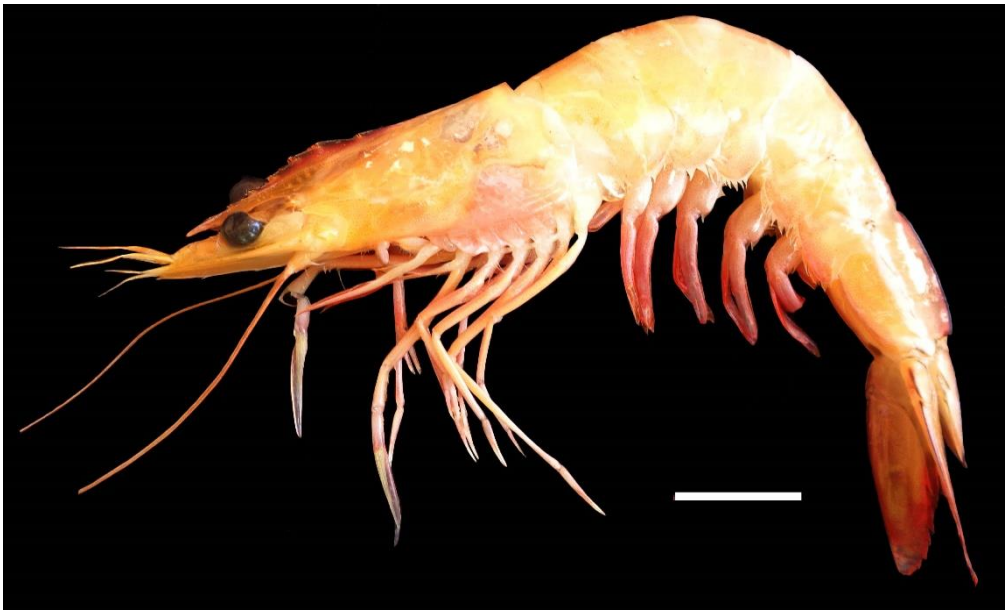

Figure 3.23 *Penaeus penicillatus* Alcock, 1905: Male lateral view. (Scale bar=1 cm).

24. *Penaeus semisulcatus* De Haan, 1844 (fig. 3.24)

Penaeus ashiaka Kishinouye, 1900: 1-29, plts. 1-9
Penaeus manilensis de Procé, 1822: 129-134.
Penaeus monodon manillensis Villaluz & Arriola, 1938: 35-41, plts. 1-4
Penaeus semisulcatus paucidentatus Parisi, 1919: 59-99, plts. 3-4.

Materials examined- 1 female and 1 male (TL-12.7 cm, CL-4.7 cm; TL-11.2 cm, CL-4.5 cm) (ZL-AR-PR-18), Subhas Nagar landing center(21°38'24.68" N 69°35'40.77" E), Porbandar District, 11 January 2018, coll. Barkha Purohit. 1 female (TL-13.2 cm, CL-4.9 cm), Mandvi (22°49’27.61” N 69°21’17.29” E), Kachchh District, 26 March 2015, coll. Barkha Purohit. 1 male (TL-10.4 cm, CL-4.3 cm), Gogha (21°40’55.35” N 72°17’02.30” E), Bhavnagar District, 15 October 2017, coll. Barkha Purohit.

Diagnosis- Carapace smooth; rostrum armed with 6-8 dorsal and three ventral teeth; carapace grooves and carinas distinct; postrostral carina well developed, reaching nearly to posterior margin of carapace, with a distinct

median groove; adro-rostral carina extending beyond last postrostral tooth; gastrofrontal carina absent; hepatic carina long and extending behind antennal carina, straight but distinctly sloping anteroventrally (fig. 3.24a); P5 with exopod; petasma of males with disto-median projections short and not overhanging distal margin of costae (fig. 3.24b); thelycum of females formed by two sub-oval lateral plates with tumid lips; anterior process subtriangular and with raised edges, posterior process convex and partly inserted between lateral plates (fig. 3.24c); telson without lateral spines.

Coloration- The fresh specimens are reddish-brown to pale brown or dark green. The whole carapace is covered with light yellow transverse lines. The eyes are light brown with many black dots. Rostral teeth are dark brown. Antennal flagella alternated with white and brown bands. Both legs and pleopods are reddish, covered with some white markings, tips, and bases of pereiopods and pleopods whitish. The distal half of the uropods are dark reddish-brown, with red color margins.

Zonation and Habitat- This species has been collected from trawl catch, depth of 2 to 40 m.

Distribution- This species is distributed along the Indo-Pacific, Red Sea, East, and Southeast Africa to Japan, Korea, the Malay Archipelago, and northern Australia, the eastern Mediterranean through the Suez Canal, Egypt, Israel, Lebanon, Syria, and Southern Turkey (Holthuis, 1980).

In India, the species is previously reported from both East and West coast: Gujarat, Maharashtra, Goa, Karnataka, Kerala, Tamil Nadu, Andhra Pradesh, Odisha, and West Bengal (Radhakrishnan et al., 2012)

Commercial/Ecological Importance- This species has commercial importance and is used as a food source.

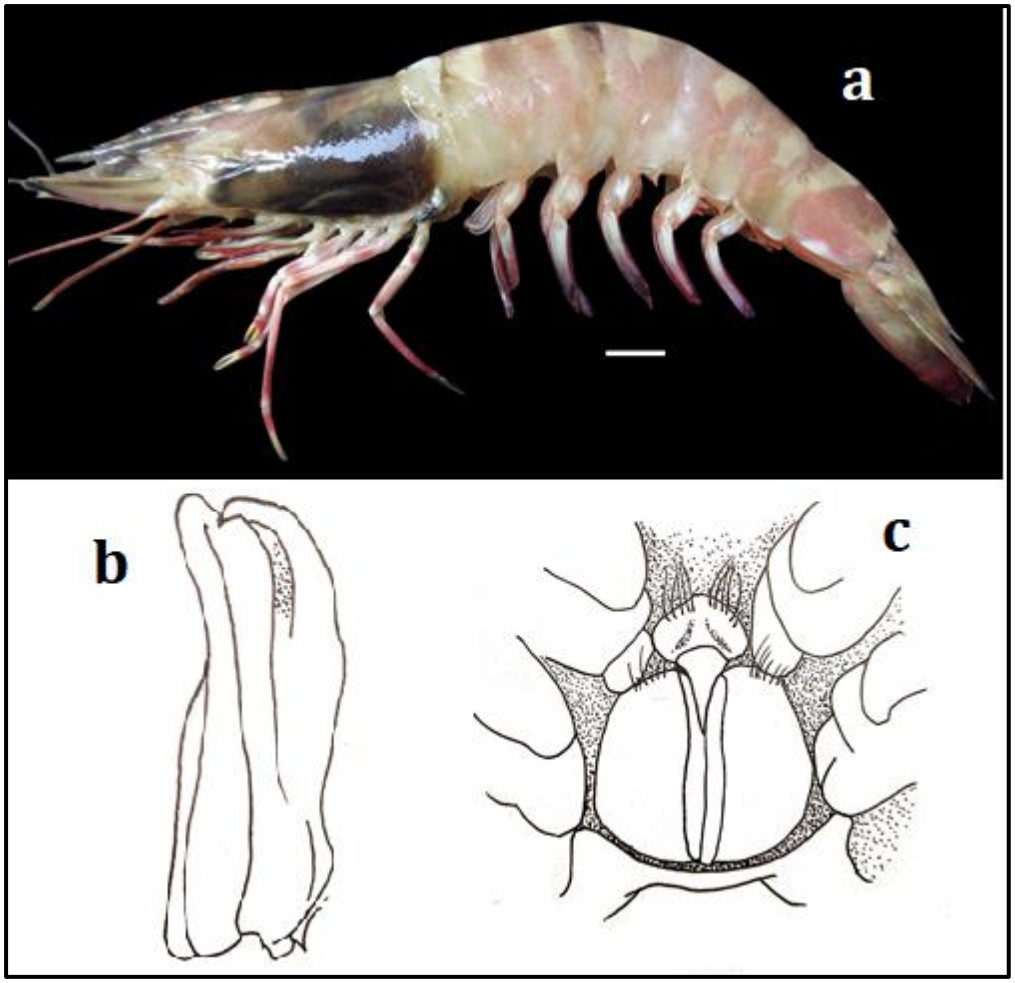

Figure 3.24 *Penaeus semisulcatus* De Haan, 1844: a. Male lateral view; b. Thelycum; c. Petasma. (Scale bar=1 cm).

Genus *Trachysalambria* Burkenroad, 1934

Diagnosis- Body densely setose, rostrum short, only dorsal teeth present, extend beyond the base of second antennular segment but not beyond the third segment; orbital, hepatic and antennal spine present on carapace; pterygostomian angle usually blunt, always lacking spine; postocular groove absent; orbit antenna groove shallow; cervical groove weak, short, moderately long or absent; hepatic groove marked or indistinct, ending anterior to hepatic spine; transverse suture may be short and well-marked or indistinct; abdomen with sixth somite lacking cicatrix; antennule lacking parapenaeid spine; antennular flagella shorter than carapace; basial spine lacking on Mxp3; P1 and usually on P2 with basial spine; spine present or absent on ischium of P1; petasma symmetrical, semi-closed, with lateral

lobes produced distally into usually large, hornlike or wing like projections, extending either horizontally or curving downward; thelycum closed, with plate on sternite fourteen broad anterior margin bracket shaped ({) anterior sterna plate sternite thirteen like an inverted heart shaped, anterior angle raised, posterior margin divided into half with a deep cleft, each half with two short lobule posteriorly; telson with 1-4 pair of movable lateral spines, usually three.

25. *Trachysalambria curvirostris* (Stimpson, 1860) (fig. 3.25)

Penaeus curvirostris Stimpson, 1860: 22-47.
Trachypenaeus curvirostris (Stimpson, 1860): 22-47.

Materials examined- 5 females and 1 male (TL-4.8 cm, CL-2.7 cm; TL-7.4 cm, CL-2.8 cm; TL-6.7 cm, CL-2.9 cm; TL-7.8 cm, CL-2.7 cm; TL-8.1 cm, CL-2.9 cm; TL-7.2 cm, CL-2.6 cm) (ZL-AR-PR-53), Subhas Nagar landing center (21°38'24.68" N 69° 35'40.77"), Porbandar District, 11 January 2018, coll. Barkha Purohit.

Diagnosis- Body densely pubescent; abdomen with a small median tubercle on the second segment, mid-dorsal carina on the last four segments; episodes present on first three pereiopods; petasma with broad wing-like distolateral projection directed laterally and curved dorsoventrally; thelycum anterior plate curved anteriorly with a median groove posteriorly and a blunt pointed anterior margin; telson armed with three or four small movable lateral spines sub-equal in size.

Coloration- The entire body is pink to reddish-brown, sometimes whitish on the sides. The abdominal carina is white, and pleopods are white with red patches or reddish-brown, and uropods bright red to reddish-brown with a distinct white margin.

Zonation and Habitat- This species has been collected from trawl catch, depth of 10 to 40 m.

Distribution- This species is distributed along the Indo-West Pacific, Red Sea, East Africa, Madagascar to China, Japan, Australia, Eastern Atlantic, the eastern Mediterranean through the Suez Canal and Egypt, Israel, and Turkey (Holthuis, 1980).

In India, the species is previously reported from both East and West coast: Gujarat, Kerala, Karnataka, Tamil Nadu, and Andhra Pradesh (Radhakrishnana et al., 2011).

Commercial/Ecological Importance- This species has commercial importance and is used as a food source.

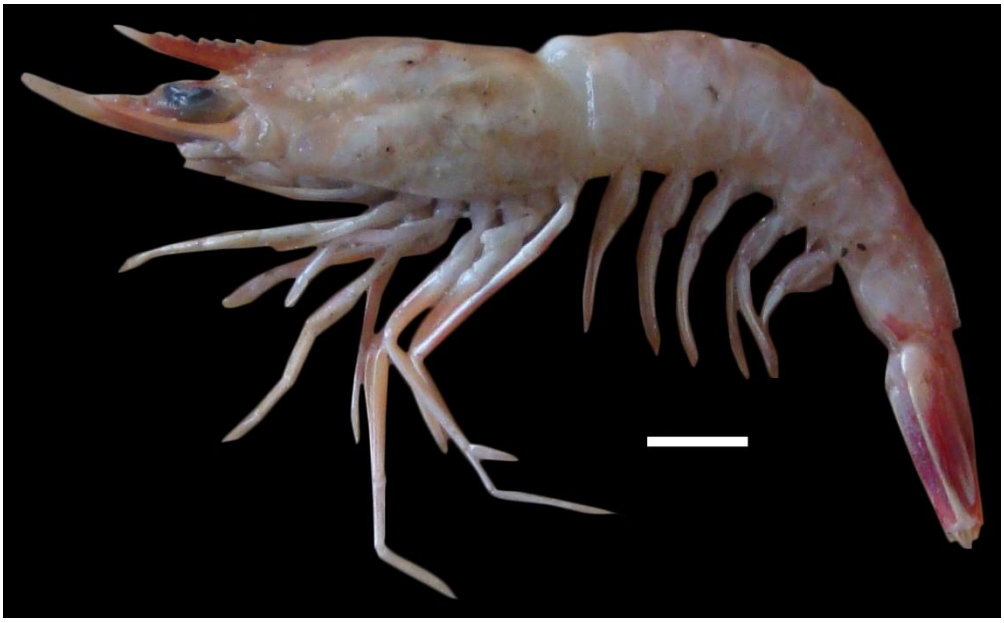

Figure 3.25 *Trachysalambria curvirostris* (Stimpson, 1860): Female lateral view. (Scale bar=1 cm).

Family **Solenoceridae Wood-Mason in Wood-Mason & Alcock, 1891**

Diagnosis- Rostrum short, strongly compressed, teeth armed only on dorsal; antennal, hepatic and postorbital spine present; pterygostomian or branchiostegal spine present or absent; cervical groove long-reaching almost mid dorsum of carapace; hepatic groove well defined; abdomen carinate dorsally; antennular flagella longer than carapace, tube-like structure present parallel to antennal flagella; mandibular pale segmented, distal segment sub-triangular, first maxilla with un-segmented palp; P1

bearing a spine on basis and ischium; second pereiopod basis armed with a spine; exopods present on all maxillipeds and pereiopods; petasma (male reproductive organ) with heavily sclerotized lateral lobe; endopod of second pleopod bearing appendices masculine and interna; thelycum is 'open type,' not enclosing seminal receptacle.

Key to genera of the family Solenoceridae occurring in India (in Gujarat*)

1. Telson with three pair of movable spine…… **2**

—Telson with a single pair of subapical fixed spine, or without; without an accessory branchiocardiac carina…… **3**

2. Carapace with Post-cervical spine, situated dorsal to hepatic spine..... ***Gordonella***

— Carapace without post-cervical spine ..... ***Haliporus***

3. Orbital spine present …… **4**

—Orbital spine not present…… **5**

4. P4 and P5 normal, antennular flagella flattened ……..…… ***Solenocera****

—P4 and P5 flagelliform …… **5**

5. P5 flagelliform, considerably longer than P4 …… *Hadropenaeus*

—P4 and P5 flagelliform …… ***Hymenopenaeus***

Genus *Solenocera* Lucas, 1849

Parasolenocera Wood-Mason in Wood-Mason & Alcock, 1891: 268-286

Solenocera (*Parasolenocera)* Wood-Mason & Alcock, 1891:

Transolenocera Burkenroad, 1934: 61-143.

Diagnosis- Rostrum relatively short strongly compressed on lateral sides; armed only with dorsal teeth; postorbital, antennal and hepatic spines are present on carapace; with or without pterygostomian or branchiostegal spines; cervical sulcus long, reaching up to mid-dorsum of carapace; hepatic sulcus well marked; antennular flagella longer than carapace; all maxillipeds and pereiopods with exopods; abdomen carinate dorsally; spines present on basis and ischium of P1; P2 usually armed with a spine on basis; endopods of Plp2 in males with appendix masculina and interna;

petasma with heavily sclerotized lateral lobe, bearing terminal process on distal extremity of dorsolateral lobule; thelycum "open type," not enclosing seminal receptacle; telson with a median sulcus and a pair of fixed lateral spines present.

26. *Solenocera choprai* Nataraj, 1945 (fig. 3.26)

Solenocera choprai Nataraj, 1945: 91-98.

Materials examined- 3 females (TL-9.9 cm, CL- 2.9 cm; TL-9.5 cm, CL-2.7cm; TL- 10.2 cm, CL-2.82 cm) (ZL-AR-PR-20), Subhas Nagar landing center (21°38'24.68" N 69°35'40.77" E), Porbandar District, 11 January 2018, coll. Barkha Purohit.

Diagnosis- Rostrum short, extending about ⅔ of eyes; dorsally armed with 6-9 teeth; lower margin strongly convex; postrostral carina markedly elevated and plate-like; reaching up to posterior margin of carapace and interrupted by a notch just ahead of cervical groove; super-hepatic and branchiostegal spines absent; petrygostomian angle broadly rounded and unarmed; hepatic carina curved downward anteriorly, with a sharp bending near its anterior part curving ventrally; antennular flagella moderately long and tube-like; P5 with a coxal spine; petasma with a notch separating dorsal and ventral lobes of medial segments; thelycum with a pair of hairy protuberances located between coxopodites of P4 and P5; telson trifurcate, with a pair fixed distolateral spine.

Coloration- Generally, the body, pereiopods, and pleopods are reddish. The antennae banded dark red and white. The uropods are dark red, except for some white areas.

Zonation and Habitat- This species has been collected from trawl catch, a depth of 40 m.

Distribution- This species is distributed along the Indo-Pacific and reported from the Eastern coast of Africa, Madagascar, the Gulfs of Suez

and Arabia, Pakistan, India, Malaysia, the Philippines, Indonesia, Taiwan, Thailand, and north-east and northwest Australia (Chan, 1998; Dall, 1999).

In India, the species is previously reported from both East and West coast: Gujarat, Maharashtra, Karnataka, Kerala, and Tamil Nadu (Radhakrishana et al., 2011).

Commercial/Ecological Importance- This species has fisheries importance.

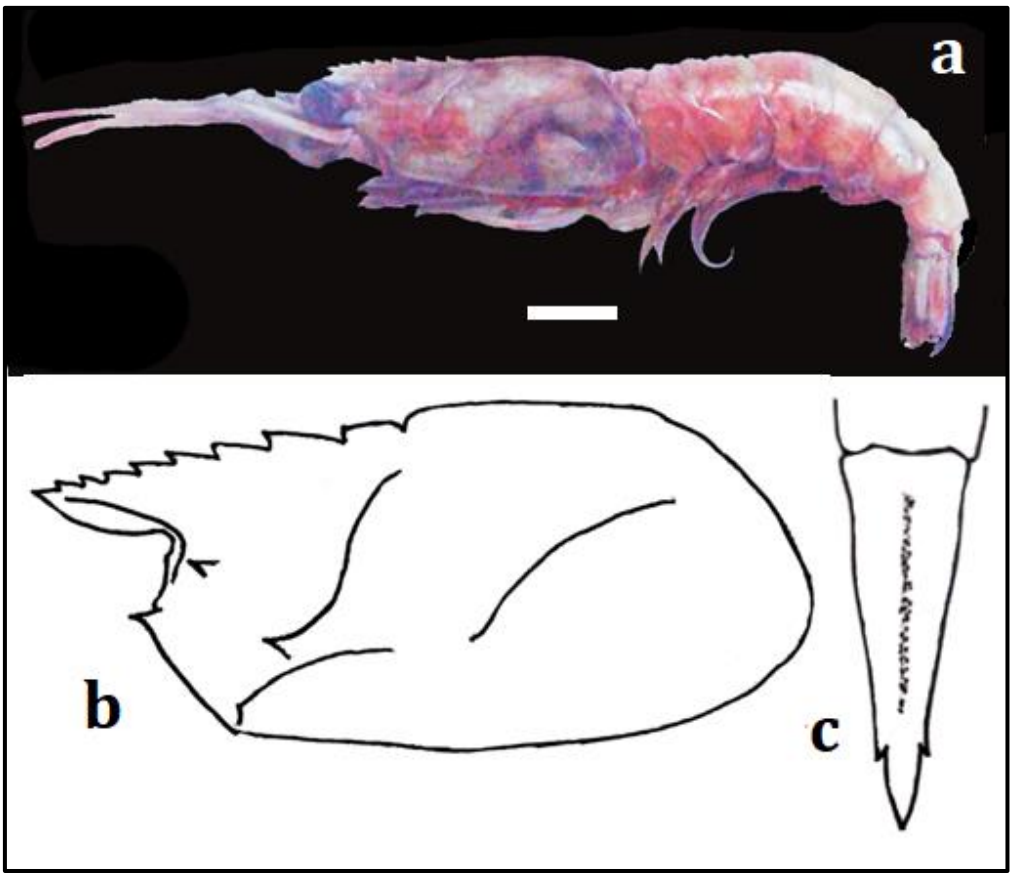

Figure 3.26 *Solenocera choprai* Nataraj, 1945: a. Female lateral view; b. Carapace; c. Telson. (Scale bar= 1 cm).

27. *Solenocera crassicornis* (H. Milne Edwards, 1837) (fig. 3.27)

Penaeus crassicornis H. Milne Edwards, 1837: 638, plts. 1-42

Penaeus planicornis Fabricius, 1798: 1-572

Solenocera indica Nataraj, 1945: 91-98

Solenocera kuboi Hall, 1956: 68-90, plts. 8-12

Solenocera sinensis Yü, 1937: 111-118

Solenocera subnuda Kubo, 1949: 1-467

Materials Examined- 1 female (TL-10.8 cm, CL-3.8 cm) (ZL-AR-PR-63), Fish landing center, Veraval (22°54'233.35" N 70°22'48.83" E), Gir Somnath District, 11 February 2017. 1 male and 1 female (TL- 8.1 cm, CL- 2.5 cm; TL-11.1 cm, CL-4.0 cm), Hazira fish market (21°14'16.42" N 72°49'08.88" E), Surat District, 3 November 2018, coll. Barkha Purohit and Rashmi Pal. 3 females (TL- 10.6 cm, CL- 3.6 cm; TL- 9.3 cm, CL- 3.2 cm; TL- 9.7 cm, CL- 3.5 cm) Subhas Nagar landing center (21°38'24.68" N 69° 35'40.77" E), Porbandar District, 10 February 2016, coll. Barkha Purohit. 1 female (TL- 9.6 cm, CL- 3.3 cm), Diu (20°43’15.33” N 70°58’59.44" E), Union Territory, 15 May 2018, coll. Barkha Purohit.

Diagnosis- Body hairless except at base of rostrum (fig.3.27a); rostrum armed with 8-10 dorsal teeth, reaching up to distal margin of eyes or little beyond; postrostral carina low and rounded, reaching posterior margin of carapace; cervical groove deep, reaching to, or nearly to, dorsal midline; postorbital spine present; suprahepatic and branchiostegal spine absent; pterygostomian angle unarmed; hepatic carina curved ventrally on anterior part, delimiting a broadly rounded loop slightly behind frontal margin of carapace; branchiocardac carina slightly sinuous and sloping anteroventrally (figs. 3.27a & b); P5 without a coxal spine; telson unarmed, not trifurcate (fig.3.27c).

Coloration- The whole body, all pairs of pereiopods and pleopods are reddish-orange to red. The posterior margin of each abdominal somite is darker. The antennae, pleopods, and uropods are uniformly red.

Zonation and Habitat- This species has been collected from trawl catch***, a*** depth of 25 m.

Distribution- This species is distributed Indo-West Pacific, Pakistan, India to the Malay Archipelago, China, and Japan (Holthuis, 1980).

In India, the species is previously reported from both East and West coast: Gujarat, Maharashtra, Karnataka, Kerala, and Tamil Nadu (Radhakrishnan et al., 2011).

Commercial/Ecological Importance- This species is one of the commercially important species from the Gujarat state.

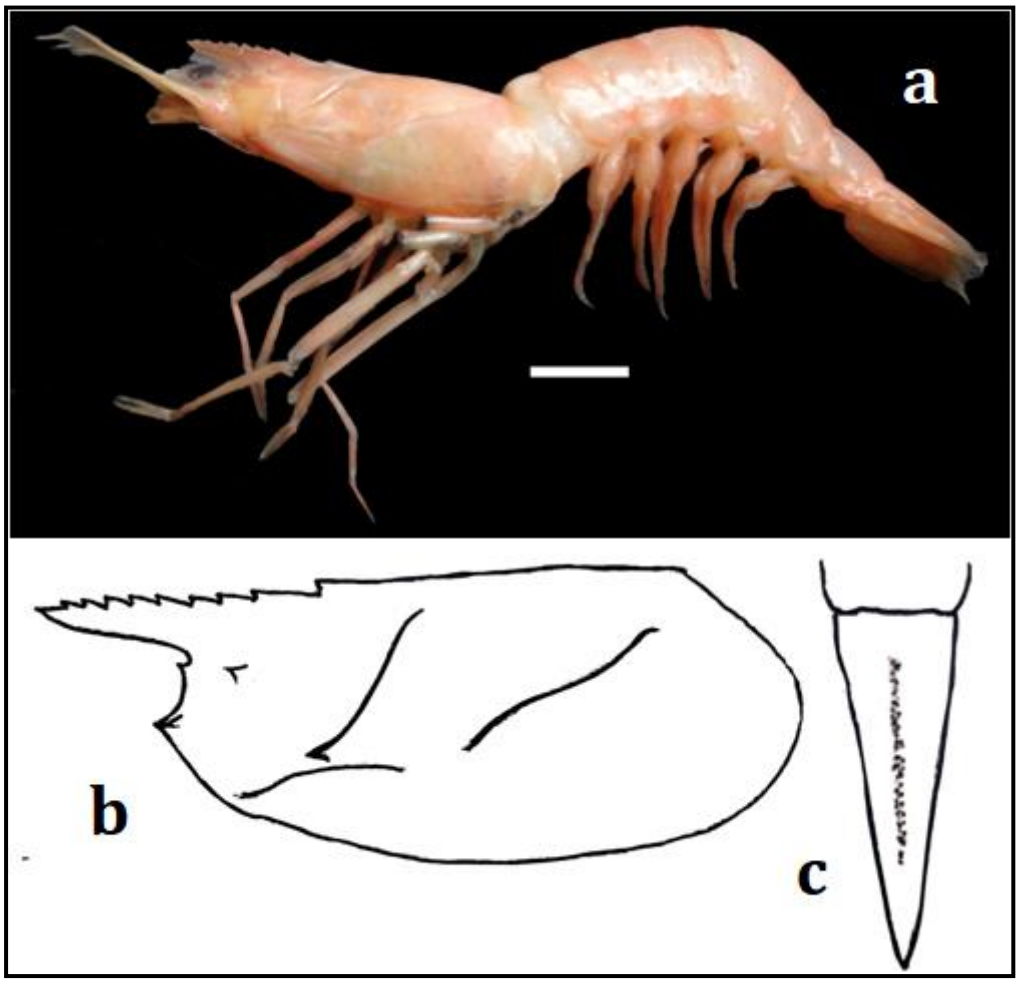

Figure 3.27 *Solenocera crassicornis* (H. Milne Edwards, 1837): a. Female lateral view; b. Carapace; c. Telson. (Scale bar=1 cm).

28. *Solenocera koelbeli* de Man, 1911 (fig. 3.28)

Solenocera depressa Kubo, 1949: 36: 1-467.
Solenocera vietnamensis Starobogatov, 1972: 359-414.

Materials Examined- 5 females (TL-10.26 cm, CL-3.92 cm; TL-11.8 cm, CL-4.6; TL-11.4 cm, CL-4.4 cm; TL-9.8 cm, CL-4.4 cm; TL-11.07 cm, CL-4.1 cm;

TL-9.7 cm, CL-3.7 cm) (ZL-AR-PR-21), Subhashnagar Bandar, Porbandar (21°38’24.68” N 69°35’40.77" E), Porbandar District, 21 February 2017, coll. Barkha Purohit.

Diagnosis- Body integument hairless and moderately hard (fig. 3.28a); setose area confined to base of rostrum and anterior dorsal part of carapace, moderately dense; antennular flagella longer than carapace including rostrum; rostrum short and armed with 7+1 dorsal teeth including epigastric tooth, ventral margin convex, setose present on base of rostrum; postrostral carina extending backward to posterior margin of carapace; postrostral groove irregular in width and posteriorly broad; orbital spine blunt; antennal and hepatic spine present; pterygostomian spine absent; pterygostomian angle rounded; cervical groove distinct (figs. 3.28a & b); mid-dorsal carina present on second abdominal somite, distinct mid-dorsal carina continue from posterior half of third abdominal somite, ending with a tooth, up to posterior margin of sixth abdominal somite, sixth abdominal somite end with acute mid-dorsal tooth; spine present on basis and ischium of P1, only basis spine present on P2; P5 reaching beyond antennal scale tip; in female, thelycum largely excavated, surrounded by anterior and lateral ridges, with two median tubercle; two pair of small rounded processes just anterior to anterior ridges (fig. 3.28c).

Coloration- Fresh specimen is generally light brown. The carapace and posterior margin of each abdominal somite are darker. The antennular flagella and distal half of the telson are red.

Zonation and Habitat- This species has been collected from trawl catch, depth of 25 to 30 m.

Distribution- This species is reported from Korea, Japan, Taiwan, South China, Vietnam, Philippines, Indonesia, Northern Western Australia, and Hong Kong (Dall, 1999).

In India, the species is previously reported from both East and West coast: Kerala, Karnataka, and Andhra Pradesh (Radhakrishnan et al., 2012).

Commercial/Ecological Importance- These species play an essential role in the seafood industries.

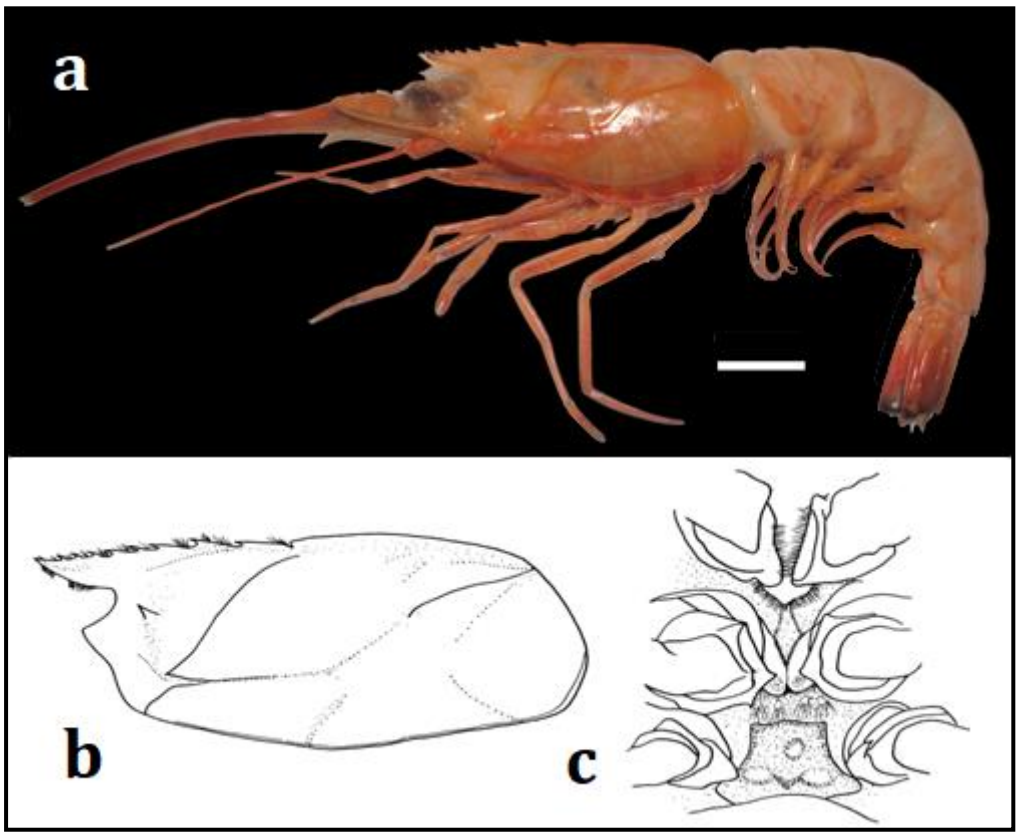

Figure 3.28 *Solenocera koelbeli* de Man, 1911: a. Female lateral view; b. Carapace; c. Thelycum. (Scale bar=1 cm).

Suborder **Pleocyemata Burkenroad, 1963**

Diagnosis: Dendrobranchiate gills absent; second pleura of abdominal segment overlapping those of first and second segments; eggs attached to pleopods setae on females, hatch as zoeae (or later); petasma in male and thelycum in female not present; female gonopores present on coxa of P3; on P5 in males; Plp with appendix masculina and appendix interna in males.

Key to infraorder of the Suborder Pleocyemata Burkenroad, 1963 (in Gujarat *)

1.P1 and P2 chelate ……..…… **Axiideae***

— Only P1 chelate…… **Gebiidea***

2. Second abdominal segment partially covering the first and third segment; P1 and P2 usually chelated, P3 without pincers; P1 and Plp1 without copulatory organ, females, carry eggs under abdomen until hatching …….. **Caridea***

—Second abdominal segment often not covering first and third, sometimes first segment expanded, enlarged and cover second; P1 to P3 usually chelated, P3 typically enlarged and robust; P1 and Plp1 without copulatory organ, females, carry eggs under abdomen until hatching ……**Stenopodidea***

Infraorder **Axiideae Saint Laurent, 1979**

Axiidea de Saint Laurent, 1979: 19, 28; Robles et al., 2009: 310-314; Dworschak et al., 2012: 187.

Callianassoidea Sakai, 2005: 1125.

Callianassidea Sakai and Sawada, 2006: 1357-1358.

Callianassida Sakai, 2011: 3

Diagnosis- P1 and P2 (first two pairs of pereiopods) chelate.

Keys to the families of the Infraorder Axiideae occurring in India (in Gujarat*)

1. Rostrum with acute or rounded apex; propodus of P3 and P4 with lateral spiniform setae; Plp3 to Plp4 with linear peduncles did not touch mesially, endopods linear to elongate-oval, exopods linear-oval, attached subdistally, shorter than endopod or as long, not overlapping endopods; maxilla scaphognathite with long setae on posterior lobe, which extend into branchial chamber…….. **Axiidae**

2. Anterior branchiostegal lobe combined smoothly with anterodorsal branchiostegal angle, or with small separate triangular sclerite; in male Plp1 absent, or if present, unarticulate or with second simple segment; in male Plp2 absent or reduced; in female Plp2 rami styliform, endopod much longer than broad; epipod of Mxp1 truncate, without anterior lobe …… **Callianassidae***

Family **Callianassidae Dana, 1852**

Callianassidae Dana, 1852: 12, 14; Dana, 1852b: 508; Bouvier, 1940: 100; Balss, 1957: 1581; de Saint Laurent, 1973: 513; de Saint Laurent, 1979: 1395; Manning and Felder, 1991: 766; Poore, 1994: 101; Sakai, 1999: 7; Sakai, 2005: 9–11; Sakai and Sawada, 2006: 1357; Sakai, 2011: 353-357.

Callianassinae Bouvier, 1940: 100; Balss, 1957: 1582; de Saint Laurent, 1973: 514; de Saint Laurent, 1979: 1395-1396; Manning and Felder, 1991: 767; Sakai, 1999: 10; Sakai, 2005: 11–25; Sakai, 2011: 357-358.

Cheraminae Manning and Felder, 1991:780; Tudge et al., 2000:136.

Lipkecallianassinae Sakai, 2005: 212.

Lipkecallianassidae Sakai, 2011: 521

Diagnosis- Rostrum short, flat, triangular, spike-like, shorter than eyestalks, or longer than broad; gastric carina not present; cervical groove well developed; suture between ocular lobe and end of linea thalassinica oblique in lateral view; anterior branchiostegal margin sinusoidal or semicircular; anterior branchiostegal lobe sclerotised, merging smoothly with anterodorsal branchiostegal angle; posterior margin of carapace without lateral lobes, first abdominal segment without anterolateral lobes, feebly chitinised; eyestalks flat; scaphocerites rudimentary; epiopd of Mxp1 truncate, without anterior lobe; dactylus of Mxp3 slender, digitiform, with irregularly setae; lower margin of merus of P1 (cheliped) smooth, or with prominent proximal tooth; major cheliped with distinctively flattened palm, sometimes with sharp apex above and below; propodus of P3 broad, with proximal lobe on lower margin, without distal spiniform setae on lateral face; P5 minutely chelate or subchelate; in female Plp2 rami-styliform; endopod much longer than broad, or sometime absent; Plp3 to Plp5 with oblique peduncles meeting mesially, endopods triangular, with straight mesial margin, exopods attached laterally, proximally lobed, longer than and enclosing endopods; appendix interna elongate, much longer than broad, or reduced; uropodal exopod with elevated dorsal plate.

Key to the genera of the family Callianassidae occurring in India (in Gujarat*)

1. Mxp3 merus longer than broad at ischium-merus suture, distally oblique with obtuse angle between distal and lower margins; in major male cheliped (major P1) merus with a simple proximal hook on lower margin …… ***Callianassa***

— Mxp3 merus broader at ischium-merus suture than long, distally convex, extending beyond articulation of carpus; in major male cheliped (major P1) merus with prominent complex truncate hook …… **2**

2. Uropodal endopod anterior margin with distal spine; telson usually with one or two pairs of lateral spines…… ***Necallianassa****

—Uropodal endopod anterior margin and telson lateral margin without spines …… **3**

3. Telson broader than long, posterior margin semicircular or sub truncate; uropodal endopod without spiniform facial setae…… ***Gilvossius****

—Telson longer than broad, posterior margin slightly concave, sometimes with medial spine; uropodal endopod with spiniform facial setae..... ***Paratrypaea***

Genus ***Gilvossius*** **R.B. Manning & Felder, 1992**

Pestarella Ngoc-Ho, 2003: 475.

Diagnosis- Rostrum obtusely triangular, flat, not reaching up to cornea; first abdominal somite tergite fused, divided into two sections by transverse step; antennular peduncle about 2.5–3 times longer than the combined width of both eyestalks; merus of Mxp3 broad at ischium-merus suture than long; in male merus of major cheliped (major P1) with prominent truncate hook armed with serrations along lower margin, excavate laterally at base; propodus of P3 rectangular, lower margin acutely convex, leading to broadly rounded free proximal lobe; in male Plp2 present or absent; uropodal endopod ovoid, usually longer than broad, anterior margin straight or somewhat convex, posterodistal margin evenly

convex; telson broader than long, almost semicircular, sometimes posterior margin sub truncate.

29. *Gilvossius rotundicaudatus* (Stebbing, 1902) (fig. 3.29)

Callianassa rotundicaudata Stebbing, 1902: 41, pl. 8. Pearson, 1905: 90; Kensley, 1974: 277; Dworschak, 1992: 202, fig. 11a-f.
Callianassa (Calliactites) rotundicaudata Borradaile, 1903: 545; De Man, 1928: 26, 92, 94, 97, 123, 136, 149,150; Barnard, 1950: 506, 512, fig. 95i-l.
Calliactites rotundicaudatus Stebbing, 1910: 369.
Pestarella rotundicaudata (Stebbing, 1902)

Materials Examined- 1 ovi. female (TL-10.91mm, CL-4.6 mm) (ZL-AR-PR-61), Shivrajpur (22°19'58'' N 68°57'01'' E), Devbhumi Dwarka, Gujarat, 28 February 2018, coll. Barkha Purohit.

Diagnosis- Body soft, smooth (fig. 3.29a); carapace oval, about ¼ of total body length, frontal margin feebly scalloped; posterior margin fringed with some setules; rostrum obtusely triangular, flat, not reaching up to cornea; eyestalk with blunt distal tip; cornea distinct, dorsolateral or dorsal; antennule peduncle slender, third segment longer than first; second segment shorter than third; second and third segment with long plumose setae (figs. 3.29a & b); a setose slit form's the opening to the auditory apparatus of the first segment; antennae peduncle longer than antennules peduncle; fifth segment slightly shorter than fourth; mandible cutting edge divided into 10-11 small teeth, increasing in size from the ends of the row towards the middle of it; Mxp3 operculiform, without exopods; enopodal ischium longer than broad, mesial surface with row of teeth, last teeth large; merus of Mxp3 broad at ischium-merus suture than long; carpus longer than broad; propodus longer than carpus, ovate, 1.7 times longer than broad; dactylus slender, with long setae (fig. 3.29c); first abdominal somite segments fused, divided into two sections by transverse step; second somite longer than first; third to fifth abdominal somites with lateral tufts of setae; sixth segment fringed laterally with setules, two rows of setae on hind margin (fig. 3.29a); major P1 massive; ischium slender,

inferior margin with four denticles, about 3.0 time longer than broader; merus broader, inferior margin with hook proximally, denticulate on proximal broader; carpus 0.7 times shorter than merus, superior margin straight, inferior margin convex; propodus 1.7 times longer than merus, 1.3 times longer than broad; fixed finger curved, with a tubercle; dactylus about 1.4 times longer than fixed finger, cutting edge with a series of dentition, tubercle present on middle (figs. 3.29d & e); minor cheliped P1 about 0.7 times as long and 0.4 times as high as major P1; ischium without teeth, 2 times longer than broad; merus shorter than carpus; carpus 2.8 times longer than broad; propodus 1.9 times longer than broad, superior margin fringed with narrow setae; fixed finger slightly longer than dactylus; long setae present on tip (fig. 3.29f); P2 chelate, ischium short, with few setae on superior margin; merus 3.0 times as long as broad at distal length; inferior margin slightly sinuous, with row of long setae; carpus 1.8 times shorter than merus, about twice as long as broad; chela 1.3 times as long as carpus; palm 1.1 times as broad as long; dactylus about 1.5 times as long as palm; fixed finger almost equal to dactylus with dense setae; tips of both fingers corneous (fig. 3.29g); P3 ischium short; merus 2.0 times as long as ischium, 2.8 times as long as broad; carpus triangular in lateral side, 1.9 times as long as broad, bearing long setae distally along on superior and inferior margin; propodus rectangular, lower margin acutely convex, leading to broadly rounded free proximal lobe; with long setae proximally on inferior margin and distally on superior margin; lateral margin with numerous tufts of short setae; mesial surface with scattered tufts setae; dactylus tear shaped, weakly curved, terminating in corneous tip, with short (fig. 3.29h); P4 slender, longer than P2 and P3; ischium short; merus 3.5 times as long as broad; carpus 0.6 times as long as merus, one tufts long setae on distolaterally; propodus longer than carpus, about 3.0 times long as broad, inferior margin with dense cluster of stiff setae on distal half, dactylus slender, ending in corneous tip, with short long setae on margins (fig. 3.29i); P5 slender, ischium 1.5 times as long as broad; merus 3 times as long as ischium, 4.3 times as long as broad; carpus becoming broadr distally, 2.7 times as long as broad; propodus 1.1 time as

long as carpus; inferior margin with dense cluster of stiff setae on distal half; dactylus spoon shaped, setose (figs. 3.29j & k); Plp1 uniramous; Plp2 biramous; Plp 3-5 biramous, foliaceous, outer ramus narrow, curved, fringed with plumose articulated setae; inner ramus triangular, appendix interna small, distinct, projecting from mesial border of endopod; endopods longer than broad, ovoid, densely fringed with setae, usually longer than broad, anterior margin straight or somewhat convex, posterodistal margin evenly convex; exopods 1.4 times longer than telson; telson 0.8 times as long as broad anteriorly and 1.3 times posteriorly, posterior border semicircular (fig. 3.29l).

Coloration- The body is translucent white, the major chela pinkish, and the eggs are yellow.

Distribution- This species is previously reported from South Africa and Sri Lanka (Stebbing, 1902**;** de Man, 1928).

In India, the species is reported for the first time from Shivrapur (Gujarat).

Zonation & Habitat-This species has been collected from the lower intertidal coral reef covered by fine mud.

Commercial/Ecological Importance- *Gilvossius rotundicaudatus* plays an important role in the ecology of littoral zones by its bioturbation, which can alter sediment properties and thereby affect the meiobenthic and macrobenthic communities.

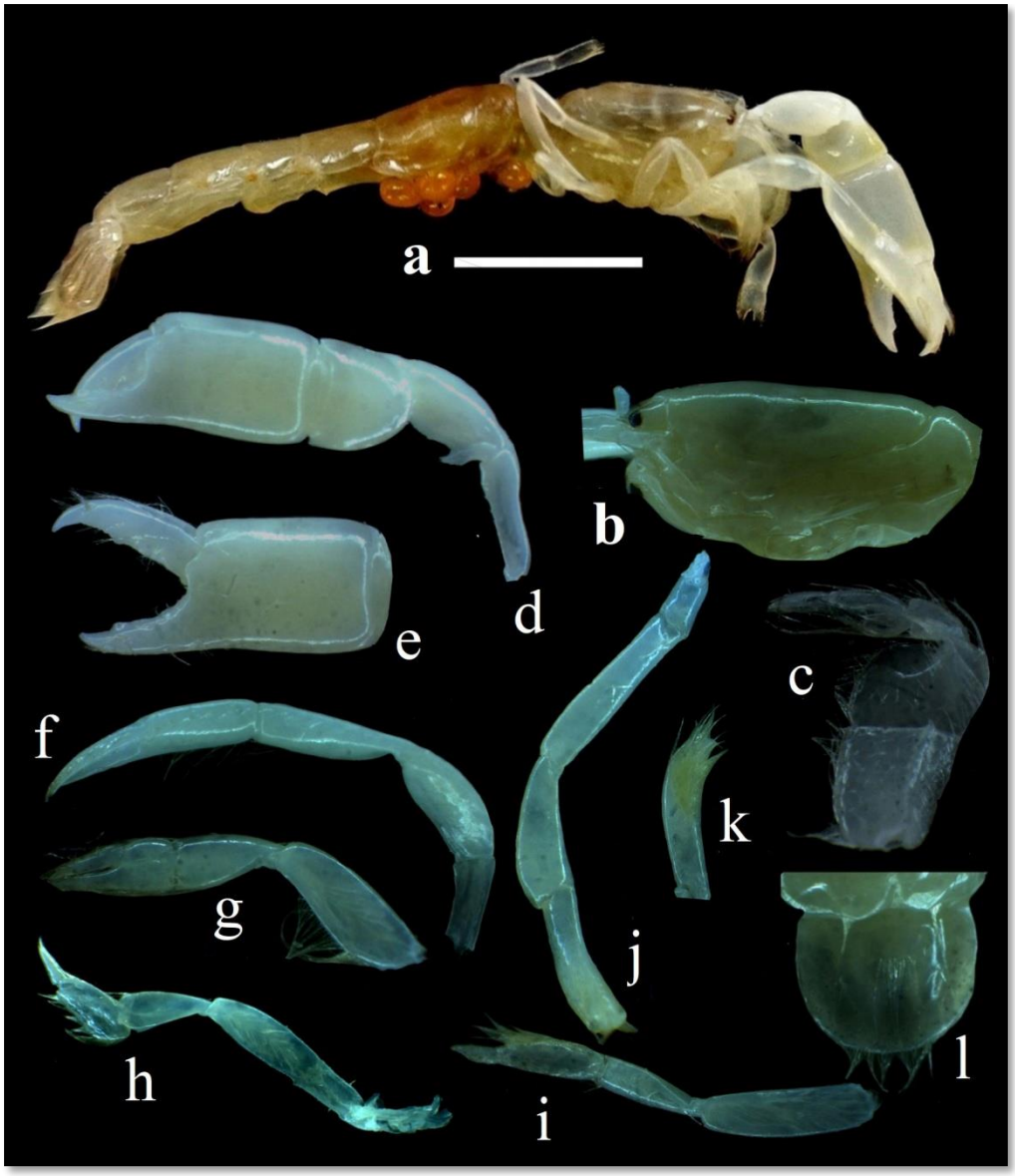

Figure 3.29 *Gilvossius rotundicaudatus* (Stebbing, 1902): a. Ovi. female lateral view; b. Carapace; c. Third maxilliped; d. Major cheliped; e. Dactylus and fixed finger of major cheliped; f. Minor cheliped; g. Second pereiopod; h. Third pereiopod; i. Fourth pereiopod; j. Fifth pereiopod; k. Tip of the fifth pereiopod; l. Telson. (Scale bar =0.5 mm).

Genus ***Neocallichirus*** **Sakai, 1988**

Neocallichirus Sakai, 1988: 61; Manning & Felder, 1991: 779, figs. 1, 3, 4; Poore, 1994: 102.

Sergio Manning & Lemaitre, 1994: 40, fig. 1; Poore, 1994: 102.

Corallianassa Manning, 1987: 392; Manning & Felder, 1991: 776.

Diagnosis- Carapace dorsally oval-shaped; rostrum spine present or not, anterolateral spine without noncalcified membrane proximally; antenna peduncle shorter and stouter than antennule peduncle; Mxp3 without exopod; ischium, merus, and propodus subquadrate; dactylus narrow, digitiform; P1 unequal; major male cheliped with or without meral hook; male P1 uniramous, two-segmented, distal segment chelated slightly; male Plp2 biramous, endopod with or without appendix masculine, fused with appendix interna; female Plp1 uniramous; Plp2 biramous, with or without appendix interna; Plp3 to Plp5 foliaceous, with appendix interna in both sexes; uropodal endopod subquadrate, distally broader or slender, tapering.

30. *Neocallichirus jousseaumei* (Nobili, 1904) (fig. 3.30)

Callianassa (Cheramus) Jousseaumei Nobili, 1904: 236; 1906: 101, pl. 6 fig. 2.

Neocallichirus jousseaumei Dworschak, 2011: 2, figs 1–4, 6F–H; 2014: 232, fig. 10b. Sakai, 2011: 458; 2015: 436. Naderloo & Türkay, 2012: 18. Sepahvand & Sari, 2013: 1002. Kneer et al., 2013a: 262–272. Sakai & Türkay, 2014: 180. Goto et al., 2014: 201, fig. 1B. Sakai & Türkay, 2015: 500. Sakai, 2015a: 436.

Neocallichirus indicus Shahvand & Sari, 2011: 46. Sakai, 2011: 458. 2015:434. Sakai & Türkay, 2014: 182. Sakai et al., 2014: 492. Sakai & Türkay, 2015: 500.

Materials Examined- 1 ovi. female (TL-96.49 mm, CL-24.09 mm) (ZL-AR-PR-60), Shivrajpur (22°19'58'' N 68°57'01'' E), Devbhumi Dwarka, Gujarat, 30 October 2017, coll. Barkha Purohit.

Diagnosis- Carapace ¼ of the total body length (fig. 3.30a); front margin with three anterior ridges, lateral ridge obtusely angular; median ridge extend beyond lateral ridge, forming rostrum; rostrum short and triangular without rostral spine; carapace without cardiac ridge and dorsal carina, distinct linea thalassinica present; dorsal oval distinctly marked posteriorly by deep transverse cardiac furrow, the latter extending

anteroventrally to either side above linea thalassinica as shallow groove marking posterior half of dorsal oval; frontal margin of carapace continued ventrolaterally beyond intersection with linea thalassinica as thickened oblique ridge ending anteriorly at prominent hepatic boss (figs. 3.30b & c); sclerotised ridge along anterodorsal margin of anterior branchiostegal lobe articulating at junction of oblique ridge and linea thalassinica; subantennular region of epistome bearing dense tuft of long setae; eyestalk reaching up to end of first antennular segment, 1.5 times as long as broader, outer margin convex, terminating in a dorsoventrally flattened rounded lobe with one to several tubercles distally; cornea black, situated dorsolaterally of eyestalk; antennular peduncle short, thick, second segment shorter than first; third segment 1.5 times as long as second segment; antennal peduncle forming lip above excretory pore with dorsolateral carina and first antennal segment; second segment longer than first segment; third segment short; fourth segment elongate, longer than first segment; second and third combined; fifth longer than fourth segment, narrow; first and second abdominal somites; abdomen long; first somite shorter than second; second longer than third to fifth; sixth somite longer than second (fig. 3.30a); Mxp3 without exopod, mesial surface with a series of teeth; merus and carpus triangular; propodus large ovoid, dactylus narrow and arcuate; major P1 massive, ischium slender, a series of teeth present on inferior margin; inferior margin of merus with toothed blade; carpus longer than merus, superior margin straight, inferior margin convex; propodus longer than carpus, proximal half of superior margin with small keel, inferior margin serrated; fixed finger slightly curved, cutting adage smooth, with small tubercles proximally; dactylus longer than fixed finger, curved, cutting edge with small tubercles proximally (figs. 3.30d & e); minor P1 massive, almost 0.7 times long and 0.5 times broader as major P1; inferior margin of ischium with a series of minute denticles; merus unarmed, superior and inferior margin rounded; carpus longer than broad; propodus longer than carpus; dactylus curved; fixed finger triangular, cutting edge and dactylus smooth; fixed finger and dactylus tip corneous (fig. 3.30f); P3 propodus rhomboidal, Plp2 biramous, endopods

with appendix interna; Plp3 to Plp5 with appendix interna embedded into mesial margin of endopod; telson broader than longer, lateral and posterior margin convex; enopods rhomboidal, slightly longer than telson; exopods longer than endopods, with anterodorsal plate (fig. 3.30g).

Coloration- The entire body is transparent with a touch of pink on the dorsal abdomen. The chelipeds are brightly pink

Zonation and Habitat-This species have been collected from the upper intertidal area of coral reef and sandy shore with rock boulders.

Distribution- This species is previously reported from Djibouti, Perim, Gulf of Tadjourah, Red sea, Socotra, Persian-Arabian Gulf, Thailand, Philippines, Japan, Indonesia, and French Polynesia (Dworschak, 2011).

In India, the species is previously reported from the West coast: Diu (Beleem et al., 2019) and Shivrajpur (Saurashtra) during the present study.

Commercial/Ecological Importance- These shrimps play an ecological role in the bioturbation of sediment.

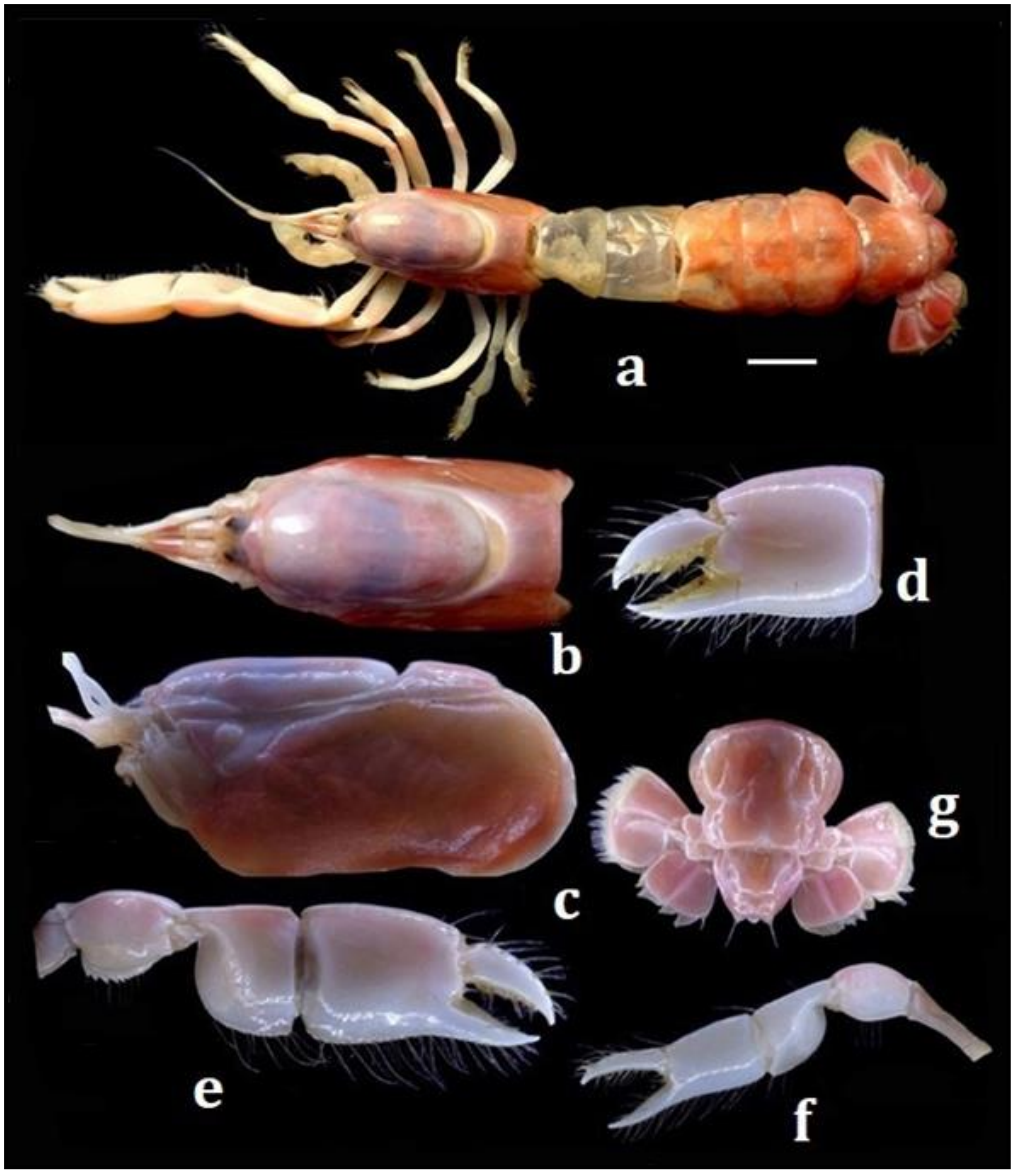

Figure 3.30 *Neocallichirus jousseaumei* (Nobili, 1904): a. Ovi. female dorsal view; b. Carapace dorsal view; c. Lateral view; d. Major cheliped propodus and dactylus; e. Major cheliped; f. Minor cheliped; g. Telson and uropods. (Scale bar =1cm).

Infraorder **Caridea Dana, 1852**

Amphionidacea Williamson, 1973:

Amphionidea Heegaard, 1969: 5-82

Eukyphida Boas, 1880: 23-210

Diagnosis- Pleura of second abdominal segment markedly enlarged, overlaps the first and second segments; phyllobranchiate gills present;

only P1 or P1 and P2 chelated (except in the unique genus *Procaris*, in which no chelation occurs); P3 never chelate; sometimes pereiopods without exopods; pleopods and uropods usually biramous; telson and uropods forms together with a tailfan; larval development metamorphic, includes protozoa, zoa, and megalopa.

Key to the superfamilies of the infraorder Caridea occurring in India (in Gujarat*)

1. P1 Subchelate…… **Crangonoidea**
— P1 Chelate or subchelate…… **2**
2. P1 and P2 similar with long slender pectinate fingers…. **Pasiphaeoidea**
— P1 and P2 not similar, without pectinate finger…… **3**
3. Pereipods with epipode ending with a naked appendix well into branchial cavity; P1 and P2 similar…….. **Oplophoroidea**
— If pereiopod with epiopode, not ending in a naked appendix; P1 and P2 similar or not similar……..**4**
4. P1 more robust and heavy; though often shorter than P2…… **5**
—P1 usually more slender than P2, rarely subequal…….. **6**
5. Pereiopods without strap-like epipods; mandibular molar process conical, laminar or vestigial…….. **Bresilioidea**
— P1 to P3 with strap-like epipods; mandibular molar process blunt, with grinding surface……**Nematocarcinoidea**
6. Periopods without arthobranches in antennule with dorsal flagellum of two branches; shallow-water species…… **Palaemonoidea** *
— Not so…… **7**
7. Right P1 chelate, left generally simple; Mxp1 with exopod abutting endite, displacing endopod…… **Processoidea**
—Both P1 simple or chelate; Mxp1 with exopod far removed from endite…….. **Pandaloidea***
8. Eyestalks normal, P1 stronger than P2 …….. **Alpheoidea***
— Eyestalks unusually elongate, if the end of antennule peduncle, P1 and P2 equally strong…….. Ogyrididae (Family)

Superfamily **Alpheoidea**

Diagnosis-Mandibles with molar processes; second maxilla with endite, well developed; Mxp1 with exopod far removed from endite; P1 distinctly chelate.

Key to the families of the Superfamily Alpheoidea occurring in India (in Gujarat*)

1. Eyestalks usually elongate, as long as the end of antennule peduncle, P1 and P2 equally strong…… **Ogyrididae***

—Eyestalks usually not elongate, P1 stronger than P2…… **2**

2. Eyes usually partly or entirely covered with carapace; P1 unequal, major one swollen…… **Alpheidae***

—Eyes not covered with carapace, P1 usually equal, not swollen…… **Hippolytidae**

Family **Alpheidae Rafinesque, 1815**

Diagnosis- Carapace smooth, cylindrical and laterally compressed; without antennule and branchiostegal spine; rostrum usually present, very small and continued posteriorly as carina; eyes usually partially or entirely covered by anterior margin of carapace; P1 usually strong, robust, and chelate; both chela not similar, major one swollen; P2 slender and rather short, equal and with pincers; carpus subdivide into several segments; last three pair (P3 to P5) short and compressed; propodus of P5 with a well develop brush of bristles arranged in transverse.

Key to the genera of the family Alpheidae occurring in India (in Gujarat*)

1. Pereiopods without epipods; pterygostomial angle (anteroventral corner of carapace) produced as rounded or acute lobe…… ***Synalpheus****

— At list P1 and P2 with epipods; pterygostomial angle rounded, rarely produced…… **2**

2. Articulating posteroventral triangular plate does not present on pleura of sixth abdominal somite …… **3**

— Articulating posteroventral triangular plate present on pleura of sixth abdominal somite …… **4**

3.Mxp3 pediform, antepenultimate segment, not operculiform…. ***Alpheus****

— Not so

4. Carpus of P2 with five segments…….…….. ***Athanas****

—Carpus of P2 with four segments……..…….…….…… ***Arete***

Genus ***Alpheus*** **Fabricius, 1798**

Cragon Weber, 1795: 94.

Alpheus Fabricius, 1798: 380, 404.

Diagnosis- Carapace continued anteriorly to form into orbital hoods, which enclose entirely eyes except on ventral side; orbital hoods projecting as rounded to acute teeth and usually demarked from rostra base by shallow or marked depressions; rostrum often present and continued posteriorly as rostral carina; pterygostomial margin of carapace rounded; antennules typically short, frequently with basal peduncular article and stylocerite short; basicerite with inferolateral tooth; carpocerite usually reaching to or beyond end of scaphocerite; carpocerite often reaching to or beyond end of scaphocerite; P1 asymmetrical generally in size and shape; major chela subcylindrical to compressed and twisted, surface smooth, dactylus with plunger, fitting into cavity on movable finger, usually well-developed, small chela usually of simple form with conical fingers, carpus of P2 subdivide into five segments; P3 to P5 robust, merus triangular; P5 "brush" distally on propodus; abdomen usually without lateral compression; pleura of sixth abdominal segment not articulated; in male endopods of Plp2 with appendix masculina and appendix interna; posterior margin of telson convex and lateral angles distinct but not acute, two pairs of dorsal spines present; anal tubercles completely well developed.

31. *Alpheus chiragricus* H. Milne Edwards, 1837 (fig. 3.31)

Alpheus Chiragricus H. Milne Edwards, 1837: 354; De Man, 1911: 415; Johnson, 1961: 53; Johnson, 1979: 36; Banner and Banner, 1978: 221; Banner and Banner, 1982: 267; Banner and Banner, 1985: 13; Chace, 1988: 18.

Alpheus edwardsii chiragricus Coutière, 1905: 912.

Materials Examined- 1 ovi. female, 1male and 1 female (TL-50.50 mm, CL-17.24 mm; TL-45.97 mm, CL-15.58 mm; TL-39.12 mm, CL-13.33 mm) (ZL-AR-PR-44), Okha (22°28'46.79" N 69°04'38.40" E), Devbhumi Dwarka District, Gujarat, 6 May 2016, coll. Barkha Purohit and Kauresh D Vachhrajani.

Diagnosis -Carapace smooth; rostrum acute and triangular, 3.03 times as long as broad at base, reaching near to end of first antennular segment, tip downward (fig. 3.31a); rostral carina abrupt and sharp; orbitorostral groove narrow and deep, extend posteriorly; antennular peduncle consist three sub equal segment, first antennular segment 0.76 times as long as second segment, second segment 1.92 times as long as broad, third segment 0.52 times as long as second; stylocerite acute, reaching end of first antennular segment; scaphocerite reaching to end of third antennular segment, lateral margin slightly concave, ends forming a spine; carpocerite equal to scaphocerite spine; major chela of P1 somewhat compressed, approximately 2.8 times as long as broad; finger occupying 0.46 total length, superior margin bearing transverse groove proximal to dactylus; superior shoulder pointed; distal portion of chela from superior groove 1.43 times longer than proximal portion, both proximal and inferior shoulders acute, almost spine from teeth; superior and infero-external margin not projecting; dactyl straight in longitudinal plane, not double-ended, bearing short, truncated plunger, palm without longitudinal carina near margin proximal to fixed finger, with "saddle" proximal to adhesive plaque; merus 2.0 times as long as broad, bearing acute tooth distally on infero-internal margin (fig. 3.31b); small chela sexually dimorphic, female

chela 4.3 times as long as broad proximally; finger and palm almost equal; merus 2.7 times as long as broad distally (fig. 3.31c); male chela 3.8 times as long as broad with finger; superior margin of palm bearing small groove proximal to dactylus that is extended slightly into outer face; inferior margin with only slightly trace of concavity comparable to groove and shoulder of major chela; dactylus proximally broadened into a triangular are demarked by fringes of short stiff setae, line margin near articulation of dactylus and curve to meet on superior surface proximal to tip; merus 2.2 times as long as broad, bearing acute spine on distal inferointernal margin, external and superior margin not projecting distally; carpal ratio of P2 8:5:2:2:3; spine present on ischium of P3; merus 4.5 times as long as broad; carpus unarmed, about 0.42 times as long as merus; propodus almost 0.7 times as long as merus, bearing eight spines; dactylus pointed, simple, ¼ times shorter than propodus; telson longer than sixth abdominal segment, 2.42 times as long as broad posteriorly; dorsal surface armed with two pair of posteriorly directed spine; each poster lateral angle with one pair of spine.

Coloration-These specimens are formalin preserved.

Habitat- This species has been collected from the lower intertidal area of rocky shore under a large tide pool and rocks.

Distribution: This species is distributed along the Indo-west Pacific, from East Africa to Southern China and Australia (Anker and De Grave, 2016).

In India, the species is the first time reported from Okha (Gujarat).

Commercial/Ecological importance- No commercial value was observed as they are tiny in size. These shrimps play an important role in intraspecific communication in the marine ecosystem.

Figure 3.31 *Alpheus chiragricus* H. Milne Edwards, 1837: a. Female dorsal view; b. Major cheliped; c. Minor cheliped. (Scale bar=1cm).

32. *Alpheus edwardsii* (Audouin, 1826) (fig. 3.32)

Athanas edwarsii Audouin, 1826:22, 274.
Alpheus edwardsii Guerin Meneville, 1829: 44, pl. 21, fig. 5.
Alpheus audouini Coutière, 1905: 911, fig. 52.

Material examined- 3 males and 3 ovi. females (TL-24.2 mm, CL-8.35 mm; TL-23.42 mm, CL-8.46 mm; TL-23.43 mm, CL- 8.32 mm; TL-22.78 mm, CL-7.85 mm; TL-25.97 mm, CL-8.53 mm; TL- 23.84 mm, CL-8.75 mm) (ZL-AR-PR-46), Shivrajpur Beach (22°19'56" N 68°56'58" E), Devbhumi Dwarka District, Gujarat, 11 November 2016 and 13 December 2016, coll. Barkha Purohit. 3 males and 1 female (TL-22.44 mm, CL- 8 mm; TL- 22.95 mm, CL-7.44 mm; TL-23.02 mm, CL-8.55 mm; TL-30.42 mm, CL-10.84 mm), Harshad (21°50’05.95” N 69°21’51.30" E), Porbandar District, Gujarat, 12 February 2017, coll. Barkha Purohit.1 males and 1 female (TL-18.57 mm, CL- 7.2 mm; TL- 23.55 mm, CL-7.05 mm), Kuchhadi Reef (21°39’06.00” N 69°33’04.33" E), Porbandar District, Gujarat, 14 February 2017, coll. Barkha Purohit.

Diagnosis- Rostrum triangular, apex acute, 1.7 times as long as broad at base, reaching up to end of first antennular segment; broad, moderately deep, orbitorostral grooves disappearing at posterior margin of orbits; first

antennular segment 0.7 as long as second antennular segment, which 1.6 times as long as broad; third antennular segment 0.6 as long as second segment; stylocerite acute, reaching end of first antennular segment; scaphocerite reaching nearly to end of third antennular segment, lateral tooth little longer; carpocerite reaching end of third segment; basicerite lateral tooth small, acute (figs. 3.32a, b & c); major chela of P1 about 2.3 times as long as broad, fingers occupying 0.3 total length; superior margin with transverse groove proximal to dactylus; proximal margin of groove never acute and obtuse, overhanging floor of groove; distal margin of groove rounded; groove continued on interiorly as poorly defined triangular depressed area, the apex of which reaches to proximal quarter of chela; groove continued on external (outer) face as well-defined quadrangular depression, proximal portion reaching linea impressa and interiorly reaching 0.3 width of palm; deep notch present on inferior margin directly opposite to superior groove, demarked proximally by heavy shoulder with tip slightly projected but not acute and distal margin of groove rounded; inferior groove extends, slightly depressed triangular area only 0.2 into outer face of palm; merus two times as long as broad, distally inferointernal margin with acute tooth; minor chela sexually dimorphic (figs. 3.32d & e); in male chela 3.8 times as long as broad, with fingers 0.6 times as long as palm; superior margin of palm bearing small rounded groove proximal to dactylus, extended moderately into outer side; inferior margin with only minor trace of concavity comparable to groove and shoulder of major chela; dactylus proximally broadened into a triangular region demarked by fringes of short strong setae, which line margins near articulation of dactylus and curve to meet on superior surface proximal to tip; usual "balaeniceps" development; in female, minor chela about 4.4 times as long as broad with fingers and palm almost equal; chela with traces of major chela sculpturing, but less developed than male, and without fringe of setae on dactylus; in both male and female merus of minor chelipeds similar, about 2.2 times as long as broad with an acute tooth distally on infero-internal margin; external and superior margins not projecting distally (figs. 3.32f & g); carpal ratio of P2 10:6:3:3:5; ischium of

P3 with strong spine; merus 4.7 times as long as broad, carpus about 0.5 times longer than merus, superodistal margin projecting into a tooth; propodus almost 0.7 as long as merus, with six inferior spines and two distal spines; dactylus simple and slightly curved, 0.3 times as long as propodus (fig. 3.32h); telson 2.1 times as long as broad; dorsolateral spines small; outer pair of terminal spines longer than dorsal spines, inner spines a little longer (fig. 3.32i).

Coloration- The Carapace grayish-green, no color above the eyes. The sides are lighter than the dorsal, and the abdomen is grayish-green with seven longitudinal rows of white spots. The tip of the pleura with a white spot. The pale transverse band present at the base of the telson and distal part of the telson is dark bluish with brown hairs. The antennules and antennae are bluish-grey. The chelipeds are bluish-grey, and fingers are pale, with brown tips.

Zonation and Habitat-This species are primarily intertidal, where it lives under rocks, in clumps of coral, sandy, and muddy areas.

Distribution-This species is distributed along the Indo-west Pacific, the Red Sea, and Eastern and South Africa to Japan and Australia (Anker and De Grave, 2016).

In India, the species is previously reported from the East and West coast: Karnataka (Bhuti, 1976), Lakshadweep Island (Coutière, 1905), Tamil Nadu (Henderson, 1893), Andaman Island (Chopra, 1923), West Bengal (Radhakrishnan et al., 2012) and Odisha (Mahapatro et al., 2015).

Commercial/Ecological importance- No commercial value was observed as they are tiny in size. Snapping shrimps plays an important role in intraspecific communication in the marine ecosystem.

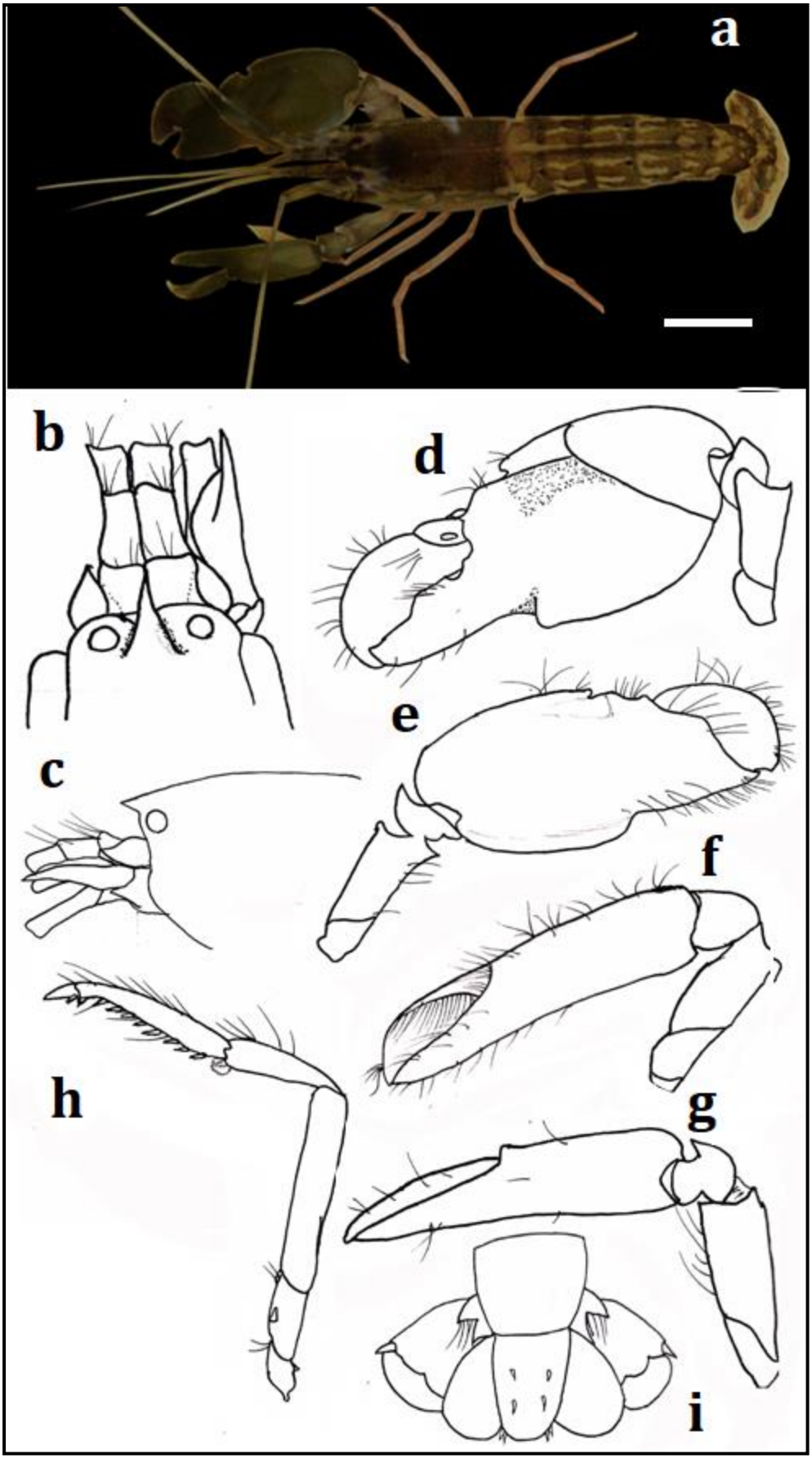

Figure 3.32 *Alpheus edwardsii* (Audouin, 1826): a. Female dorsal view; b. &

c. carapace; d. & e. Major chela; f. & g. Minor chela; h. Third pereiopod; i. Telson. (Scale bar a=1cm).

33. *Alpheus lobidens* De Haan, 1849 (fig. 3.33)

Alpheus lobidens De Haan, 1849: 179; Banner and Banner, 1985: 19; Chace, 1988: 34; Hayashi, 1998: 394.
Alpheus lobidens lobidens Banner and Banner, 1974: 430; Banner and Banner, 1978: 223; Banner and Banner, 1982: 252.
Alpheus lobidens polynesica Banner and Banner, 1974: 429; Banner and Banner, 1982: 256.
Alpheus crassimanus Heller, 1862: 526; Johnson, 1962: 53; Tiwari, 1965: 307; Banner and Banner, 1966: 138; Johnson, 1979: 36.
Alpheus inopinatus Holthuis and Gottlieb, 1958: 42.
Alpheus audouini (nec Coutière, 1905) Johnson, 1962: 53.

Materials Examined- 1 male and 1 ovi. female (TL-31.52 mm, CL-11.64 mm; TL-38.47 mm, CL-13.32 mm) (ZL-AR-PR-6), Okha (22°28'39" N 69°04'47" E), Devbhumi Dwarka District, 10 June 2014, coll. Barkha Purohit and Gunjan Soni. 2 males and 2 ovi. females (TL-30.17 mm, CL-11.13 mm; TL-28.37 mm, CL-9.75 mm; TL-28.36 mm, CL-9.70 mm; TL-30.92 mm, CL-10.81 mm), Shivrajpur (22°19'53"N 68°57'00"E), Devbhumi Dwarka District, 13 November 2016, coll. Barkha Purohit. 1 male (TL-28.12 mm, CL-10 mm), Beyt Dwarka (22°28’27.05” N 69°08’49.55” E), Jamnagar District, 14 November 2016, coll. Barkha Purohit. 1 male (TL-22.75 mm, CL-8.07 mm), Poshitra (22°24’06.86” N 69°11’56.89” E), Devbhumi Dwarka District, 15 November 2016, coll. Barkha Purohit. 2 males and 1 ovi. female (TL-30.25 mm, CL-10.62 mm; TL-36.59 mm, CL-12 mm; TL-30.92 mm, CL-10.81 mm), Koliyaak (21°35'45" N 72°17'17" E), Bhavnagar District, 26 December 2016, coll. Barkha Purohit and Swapnil Gosavi. 1 male and 1 female (TL-38.76 mm, CL-13.42 mm; TL-28.42 mm, CL-9.54 mm), Unchakotda (21°07'40" N 71°58'44" E), Bhavnagar District, 26 December 2016, coll. Barkha Purohit and Kauresh D. Vachhrajani. 1 ovi. female (TL-38.62 mm, CL-13.07 mm), Koteshwar (23°41’40.86” N

68°31’57.90” E), Kachchh District, 27 April 2016, coll. Kauresh D. Vachhrajani. 1 male (TL-22.14 mm, CL-8.01 mm), Dwarka (22°14’30.62” N 68° 57’21.16” E), Devbhumi Dwarka District, 18 December 2018, coll. Barkha Purohit.

Diagnosis- Rostrum acute, triangular, varying from 1.2 times as long as broad-reaching almost to end of first antennular segment; orbitorostral grooves shallow and rounded; second antennular segment usually about 2 times as long as broad and varying from 1.3 times length of first; third ranging from 0.6 to equal length of first; stylocerite acute, reaching to end of first antennular segment; scaphocerite with lateral tooth reaching just beyond antennular peduncle; squamous portion reaching end of antennular peduncle; tip of carpocerite reaching to end of lateral tooth of scaphocerite (figs. 3.33a, b & c); penultimate segment tip of Mxp3 curved (fig. 3.33e);major chela of P1 2.4 times as long as broad, fingers occupying the distal 0.4; superior saddle broad and relatively shallow, proximal shoulder usually gently rounded but at times almost abrupt, distal shoulder always gently rounded; medial palmar depression a well-marked triangle whose apex reaches half the distance from saddle to proximal end of palm; lateral palmar depression quadrangular, reaching to linea impressa; inferior shoulder heavy and rounded; inferior notch broadly "U"-shaped, continuing on lateral face of palm as a well-defined but small triangular depression with rounded apex, and on medial face as a longer, broader, but less well-defined depression; plunger pronounced; merus a little longer than broad bearing no teeth distally on inferointernal margin (figs. 3.33d & e); minor chela sexually dimorphic; in male chela balaeniceps, varying from 3.1 times as long as broad; in fully mature specimens palm usually bears sculpturing similar to that of major chela but reduced; in smaller males sculpturing greatly reduced and may be almost absent; in female chela not balaeniceps, varying from 3.5 times as long as broad; sculpturing on palm changing with maturity of female, with larger specimens bearing superior indentation and inferior shoulder strong but less developed than in large males while in smaller females all sculpturing may be lacking (figs. 3.33f &

g); carpal ratio of P2 varying as indicated 10:6:3:3:4; ischium of P3 usually with movable spine; merus inermous, varying from 3.5 times as long as broad; distal margins of carpus not produced into acute processes; propodus usually with ten spines; dactylus simple slightly curved; telson 2.3 times as long as posterior margin is broad, spines on upper surface small.

Coloration- The whole body is greenish-brown with dark pale longitudinal stripes present on the abdomen. The chela is brownish, and the fingers of the major chela orange are apically violet.

Zonation and *Habitat-* This species has been collected from the rocky shores and reefs with mixed sand-rubble-rock bottoms to fine sand-silt and mud, usually under rocks, and found in burrows on mudflats. This species is typically found in the intertidal and shallow subtidal.

Distribution- This species is previously reported from the Indo-west Pacific, from the Red Sea and South Africa to Japan, Australia, and Hawaii (Anker and De Grave, 2016).

In India, the species is previously reported from both the East and West coast: Karnataka (Bhuti, 1976), Lakshadweep Island (Venkataraman et al., 2004), Tamil Nadu (Banner and Banner,1979), Andhra Pradesh (Chopra, 1923), Orissa (Kemp, 1915; Mahapatro et al., 2015), West Bengal (Choudhury et al., 1984), Bay of Bengal (Chopra, 1923), Andaman and Nicobar Island (Heller, 1865; Chopra, 1923)

Commercial/Ecological importance- No commercial value was observed as they are tiny in size. Snapping shrimps plays an important role in intraspecific communication in the marine ecosystem.

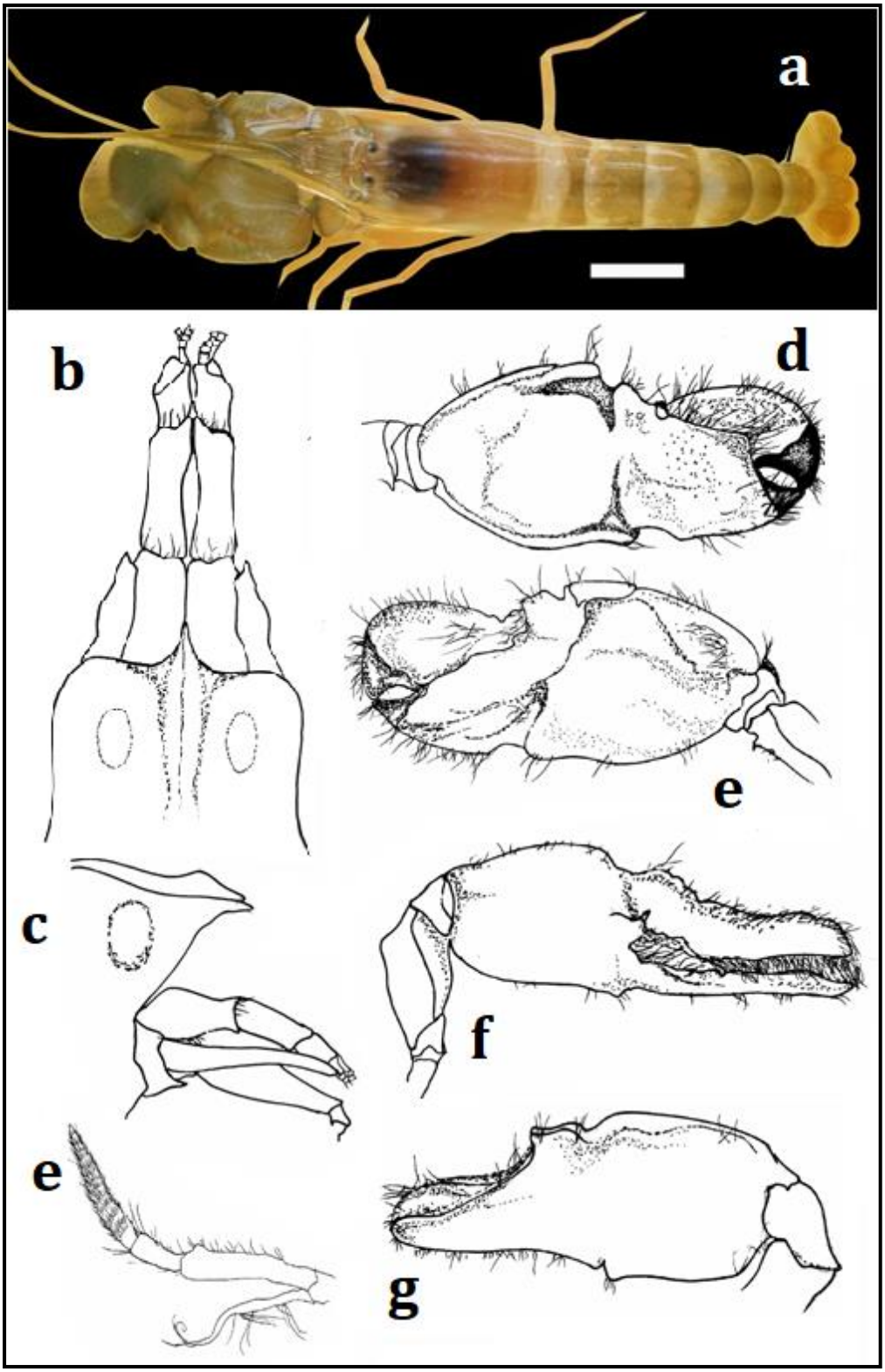

Figure 3.33 *Alpheus lobidens* De Haan, 1849: a. Female dorsal view; b. & c. carapace; d. & e. Major chela; f. & g. Minor chela; h. Third maxilliped. (Scale bar a=1cm).

34. *Alpheus malabaricus* (Fabricius, 1775) (fig. 3.34)

Alpheus dolichodactylus Ortmann, 1890: 437-542, plts. 36-37.
Alpheus dolichodactylus var. leptopus de Man, 1910: 287-319.
Alpheus forceps White, 1847: 1-8.
Alpheus malabaricus mackayi Banner, 1959: 130-155.
Alpheus malabaricus songkla Banner & Banner, 1966: 1-168,
Alpheus malabaricus trefzae Banner & Banner, 1982: 1-357.
Astacus malabaricus Fabricius, 1775: 832.

Materials Examined- 1 female (TL-17 mm, CL-7 mm) (ZL-AR-PR-7), Umarsadi (20°30'39.02" N 72°53'14.23" E), Valsad District, 10 June 2014, coll. Barkha Purohit.

Diagnosis- Body unusually not compressed or setose; rostrum acute, triangular, reaching up to distal margin of first antennular segment, variable in length; median carina moderately sharp to rounded, not reaching posteriorly beyond orbital hoods, base not abruptly delimited from adrostral carina; carapace without tooth or tubercle on gastric region; dorsal carina sharply present; a small ventrolateral spine present on basicerite, not nearly reaching up to level of tip of stylocerite; second antennular segment about 2.0 times as long as broad; antennal scale with lateral margin moderately concave to nearly straight, distolateral spine sharp but not unusually stout, distinctly overreaching to distal margin of blade or not (figs. 3.34a, b & c); ultimate segment 2.3 times longer than penultimate segment; penultimate segment straight, reaching up to end of ischium (fig. 3.34d); merus of P1 with acute distal tooth on inferior flexor margin; major chela compressed, longer than broad; fine setae present on dactylus and propodus; dactylus straight in longitudinal plane, not double-ended, plunger moderately well-developed to barely distinguishable; palm with longitudinal furrow but no carina near margin proximal to fixed finger, with "saddle" proximal to adhesive plaque, shoulder proximal to "saddle" obtusely rounded to slightly projecting and overhanging "saddle" (figs. 3.34d & e); minor chela 5 times as long as broad (figs. 3.34g & h); P2

with proximal carpal segment from slightly longer than to twice as long as second segment, carpal ratio 10:5:2:2:3; P3 dactylus subspatulate, propodus with or without series of spinules on flexor margin; carpus with blunt distal projection on flexor margin, small acute distal tooth present on flexor margin; merus unarmed, ischium with movable spine.

Coloration- Not observed.

Zonation and *Habitat-* This species has been collected from mangrove mudflats.

Distribution- This species is distributed along the Indo-west Pacific, from East Africa to Japan, Indonesia, Australia, and Hawaii (Anker and De Grave, 2016).

In India, the species is previously reported from both East and West coast: Maharashtra (Mandal and Harkantra, 2013), Karnataka (Bhuti, 1976; Bhat and Neelakantan, 1984), Kerala (Thomas, 1976; Banner and Banner 1979; Nataraj, 1942; Gibinkumar et al., 2012), Malabar Coast (Fabricius, 1875; Thomas, 1976), Tamil Nadu (Henderson, 1893; Thomas, 1976; Gopalakrishnan et al., 2012), Andaman and Nicobar Island (Kemp, 1915), Andhra Pradesh (Subrahmanyam, 1976; Ravindranath, 1982; Rath et al., 2016), Orissa (Kemp, 1915), and West Bengal (Sarkar and Alukdar, 2003).

Commercial/Ecological importance- No commercial value was observed as they are tiny in size. Snapping shrimps plays an important role in intraspecific communication in the marine ecosystem

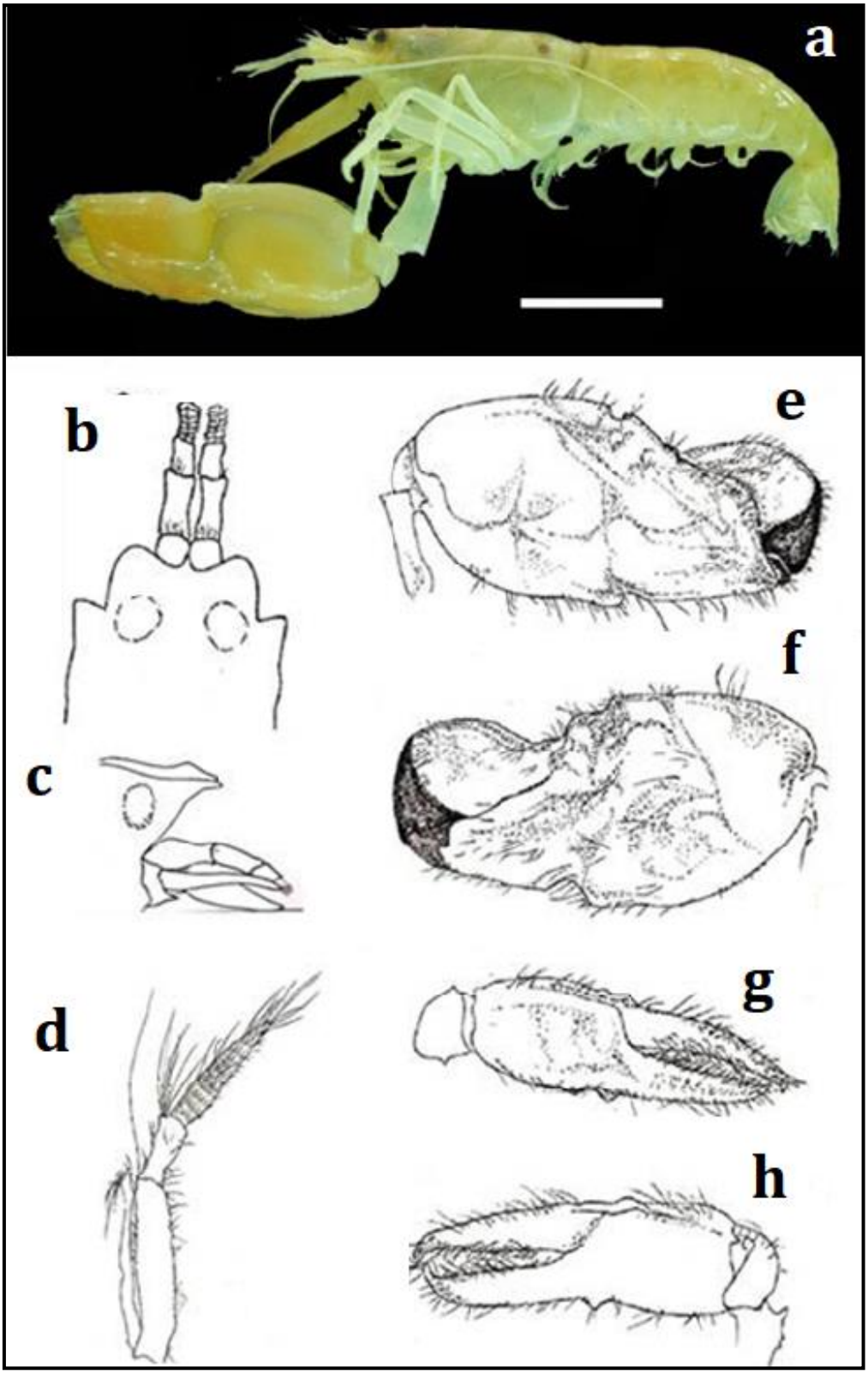

Figure 3.34 *Alpheus malabaricus* (Fabricius, 1775): a. Female dorsal view; b. & c. carapace; d. Third maxilliped; e. & f. Major chela; g. & h. Minor chela. (Scale bar =1cm).

35. *Alpheus pacificus* Dana, 1852 (fig. 3.35)

Alpheus pacificus Dana, 1852a: 21; Dana, 1852b: 544; De Man, 1911: 427; Tiwari, 1965: 315; Banner and Banner, 1966: 143; Banner and Banner, 1978: 227; Banner and Banner, 1982: 217; Banner and Banner, 1985: 26; Chace, 1988: 45.
Alpheus gracilidigitus Miers, 1884: 287.
Crangon pacifica Banner, 1953: 138

Material Examined- 2 males and 3 ovi. females (TL-35.70 mm, CL-11.56 mm; TL-27.93 mm, CL-13.37mm; TL-26.97 mm, CL-12.92 mm; TL-33.72 mm, CL-10.61 mm; TL-33.46 mm, CL-11.78 mm) (ZL-AR-PR-42), Veraval (20°54'43'' N 70°20'58'' E), Gir Somnath District, 7 April 2017, coll. Barkha Purohit.

Diagnosis- Rostrum elongate, acute, triangular, almost double as long as broad at base, reaching nearly end of first antennular segment, lateral margin bearing a pair of short setae; rostral carina rounded dorsally; orbital hood unarmed, rounded and moderately swollen; first antennular segment bearing very shallow, broad V shaped carina, second antennular segment about 2.36 time as long as broad; 1.7 times longer than first segment, almost 1.6 times as long as third segment; stylocerite pointed; scaphocerite about 2.5 times as long as wide from lateral margin, slightly concave; distolateral tooth not reaching up to third antennular segment (figs. 3.35a &b); ultimate segment of Mxp3 4.7 times as long as broad at proximal end, 1.65 times as long as penultimate segment; distal margin truncate, bearing long and tufts setae on inner margin; penultimate segment 2.5 times as long as broad, with long dense setae; exopods slightly overreaching distal end of second segment of endopod (fig. 3.35c); first to fourth abdominal pleura broadly rounded; fifth abdominal pleuron triangular posteriorly; first three abdominal sternites bearing spine at midline(fig. 3.35a); major chela of P1 about 2.27 times as long as broad, fingers occupying distal 0.5; merus 1.8 times as long as broad, teeth absent on inferior margin; dactylus laterally compressed, tip acutely rounded;

propodus tip directed upward; superior margin concave before tip; superior saddle well defined; proximal shoulder rounded, overhanging; distal shoulder rounded, strong, blunt; lateral palm depression well defined, superior palmar depression well defined, quadrangular, extending to linea impressa; medial palmar depression triangular, reaching proximally just past middle of palm; inferior shoulder rounded, heavy, slightly slanted distally; very broad depression on inferior inner palm, not well define, shallow longitudinal depression near the bottom of distal face of palm (figs. 3.35d, e & f); minor chela of female lager than male; fingers occupying distal 0.56; inferior margin of palm with broad rounded notch below dactylar articulation; fingers about 2.32 times as long as palm, both fingers curved with acute tips; dactylus not balaeniceps; lateral cutting edge of fingers with dense series long, forward sweeping setae; finger closed tips overlapping, gapping between tips; merus about 1.8 times as long as broad, teeth absent on inferior margin, bearing short setae on inner margin (fig. 3.35g); carpal ratio of P2 10:8:2:2:5 (fig. 3.35h); ischium of P3 bearing movable spine, merus about 3.95 times as long as broad, carpus 0.43 times as long as merus, propodus1.21 times as long as carpus, bearing 7 spines; dactylus simple, 0.39 times as long as propodus (fig. 3.35i); ischium of P5 without spine; telson about 1.62 times as long as broad at anterior end, armed with two pair of stout dorsal spines, posterior margin convex, with a pair of spines at each lateral margin, bearing long setae; seta-like spines on distal margin of endopods and exopods of uropods; exopods bearing slightly slender movable spine flanked laterally by acute fixed tooth and internally by rounded lobe; movable spine not overreaching up to distal margin of exopod; transverse joints forming two convex lobes (fig. 3.35j).

Coloration- Carapace and abdominal segments are brown and white stripes extending from the middle of the carapace to the sixth abdominal somites. Both scaphocerites and carpocerites are blue. The tip of the major chela is brown, and fingers and palm irregularly white with the olive green

or blue-green band. The carpus and dactylus of P1 are blue. Telson is brown with light green-blue uropods.

Zonation and Habitat- Largely intertidal, this species has been collected from the large rocky tide pool.

Distribution- This species is previously reported from the Indo-Pacific, the Red Sea, and South Africa to Japan, Korea, Indonesia, Australia, Hawaii, French Polynesia, Rapa Nui, Clipperton, Galapagos, and Mexico to Panama (Anker and De Grave, 2016).

In India, the species is previously reported from the West coast: Karnataka (Bhuti, 1976), Kerala (Pillai, 1955), and Lakshadweep Island (Coutière, 1905).

Commercial/Ecological importance- No commercial value was observed as they are tiny in size. Snapping shrimps plays an important role in intraspecific communication in the marine ecosystem.

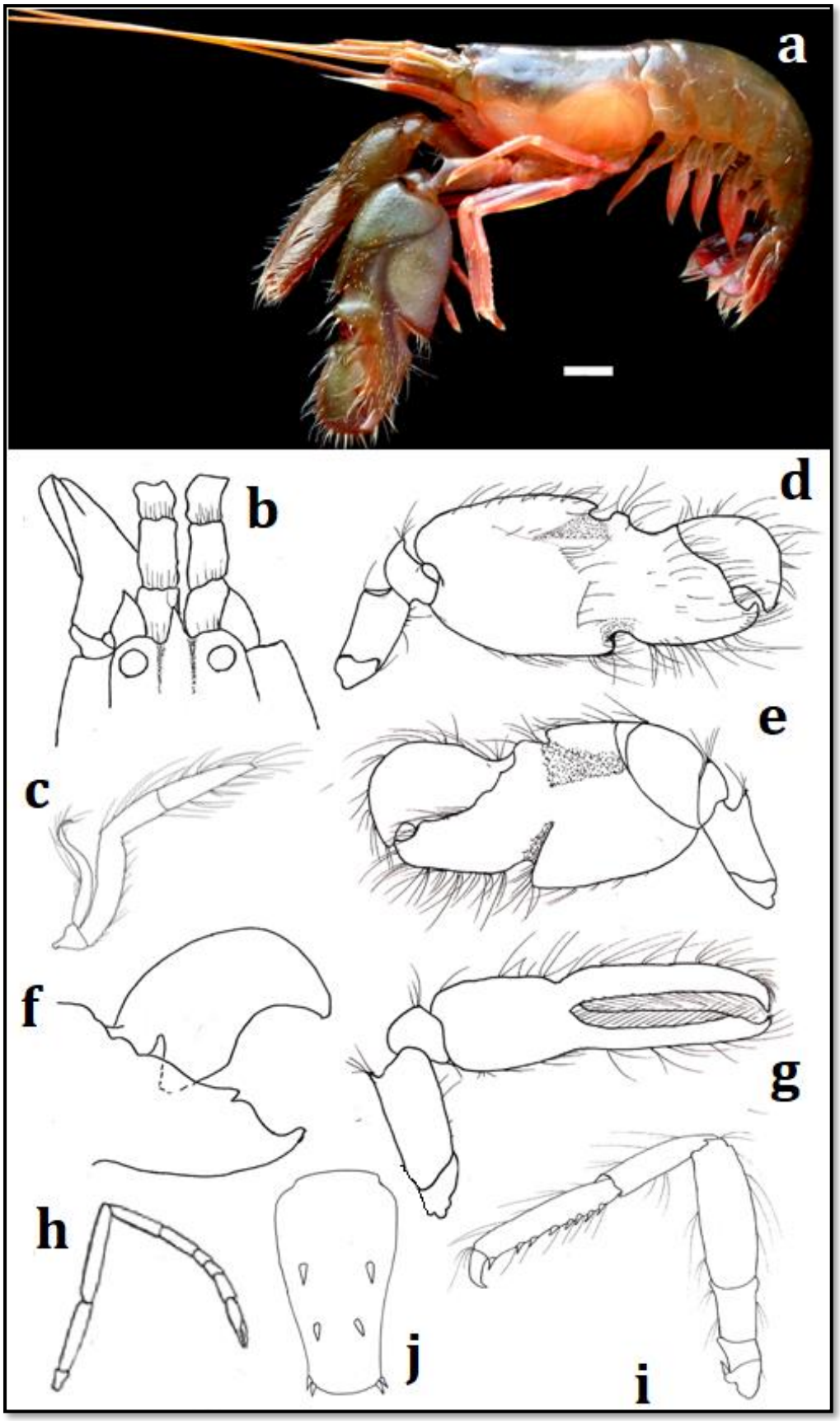

Figure 3.35 *Alpheus pacificus* Dana, 1852: a. Male dorsal view; b. carapace;

c. Third maxilliped; d. &e. Major chela; f. Distal region; g. Minor chela; h. Second pereiopod; i. Third pereiopod; j. Telson. (Scale bar =1cm).

Genus *Athanas* Leach, 1814

Diagnosis- Body usually not compressed; rostrum distinct, long and acute laterally; eyes not covered with carapace; pleura of sixth abdominal segment with an articulating posterior triangular plate; P1, P2 and other pereiopods with epipods; P1 asymmetrical; chela sexually dimorphic; chelate and swollen in male; simple and slender in females; major chela without molar-like tooth on the cutting edges of fingers; carpus five segmented.

36. *Athanas dimorphus* Ortmann, 1894 (fig. 3.36)

Athanas dimorphus Ortmann, 1894: 12; Banner & Banner, 1960: 137; Banner & Banner, 1973: 313; Banner & Banner, 1978: 234; Chace, 1988.
Athanas leptocheles Coutière, 1897b: 381.
Athanas solenomerus Coutière, 1897b: 381.
Athanas dispar Coutière, 1897c: 233.
Athanas setoensis Kubo, 1951: 265.
Athanas dimorphusseedang Banner & Banner, 1966: 28.
Alpheus monoceros Heller, 1862: 274
Athanas monoceros Johnson, 1962: 49; Johnson, 1979: 41.
Athanas transitans var. longispina Czerniavsky, 1884: 25.

Materials Examined- 1 male (TL-13.89 mm, CL-4.64 mm) (ZL-AR-PR-35), Pirotan Island (23˚36'14" N 69˚57'30" E), Jamnagar District, 22 October 2015, coll. Barkha Purohit. 1 male (TL-16.05 mm, CL-5.94 mm), Shivrajpur (22°19'56" N 68°56'58" E), Devbhumi Dwarka District, 13 December 2016, coll. Barkha Purohit.

Diagnosis- Rostrum long, acute, reaching nearly end of second antennular segment; pterygostomial angle acute; orbit without supra-corneal tooth, extra-corneal tooth acute, well developed; tip of infra-corneal tooth rounded and shorter than extra-corneal tooth, stylocerite reaching up to

half of third antennular segment; scaphocerite blade overreaching distal end of antennular peduncle; carpocerite reaching up to half of third antennular segment; basicerite armed with two teeth, dorsal teeth triangular and inferolateral tooth tapering to an acute apex (figs. 3.36 a, b & c); first right cheliped more robust than left, ischium of both pereiopods armed with two long spine from setae, merus of right pereiopod laterally compressed, tooth absent, broader than palm, carpus short; palm laterally compressed, proximal portion narrow than middle and distal portion; dactylus strongly curved armed with rounded teeth; pollex armed with two blunt teeth, fit to each other's when fingers close; setae present on cutting edge, armed with irregular dentition; left cheliped similar in length and shape (figs. 3.36c, e & f); P2 carpal ratio 5:1:1:1:2; dactylus of P3 to P5 simple, strong spinefrom seat present on distal margin of propodus; ischium of P3 and P4 with a spiniform seta, absent in P5; posterior-lateral margin of fifth abdominal segment acute; sixth segment with conspicuous movable plate; uropods with bifid protopods, acute tooth present on ending of each lobe; distolateral seta slender, reaching up to posterior margin of exopod; telson about two times as long as broad at base, two pairs of dorsal spine present; first pair of dorsal spine present around mid-length of telson, second pair around; two pairs of postero-lateral spine present, long setae present on tip.

Coloration- The entire body is semitransparent with a bluish-greenish or reddish transverse band. A distinct patch of white dots mixed with red dots is present on the dorsal of the carapace. Red color dotes are present on the abdominal somites, pereiopods, antenna, and antennular peduncle. The P1 chela is transparent white with red dots.

Zonation and Habitat- This species has been collected from the shallow reef and intertidal rocky mixed sand-rock or mud-rock flats.

Distribution- This species is reported from Indo-west Pacific, Red Sea, East Africa, India, Thailand, Philippines, Indonesia, Australia, New Caledonia, and Japan (Pachelle et al., 2011; Anker and De Grave, 2016).

In India, the species is previously reported from both East and West coast: Tamil Nadu (Banner and Banner, 1979); Karnataka (Bhuti, 1976; Radhakrishnan et al., 2012)

Commercial/Ecological importance- No commercial value was observed as they are tiny in size. These shrimps play an important role in the food web.

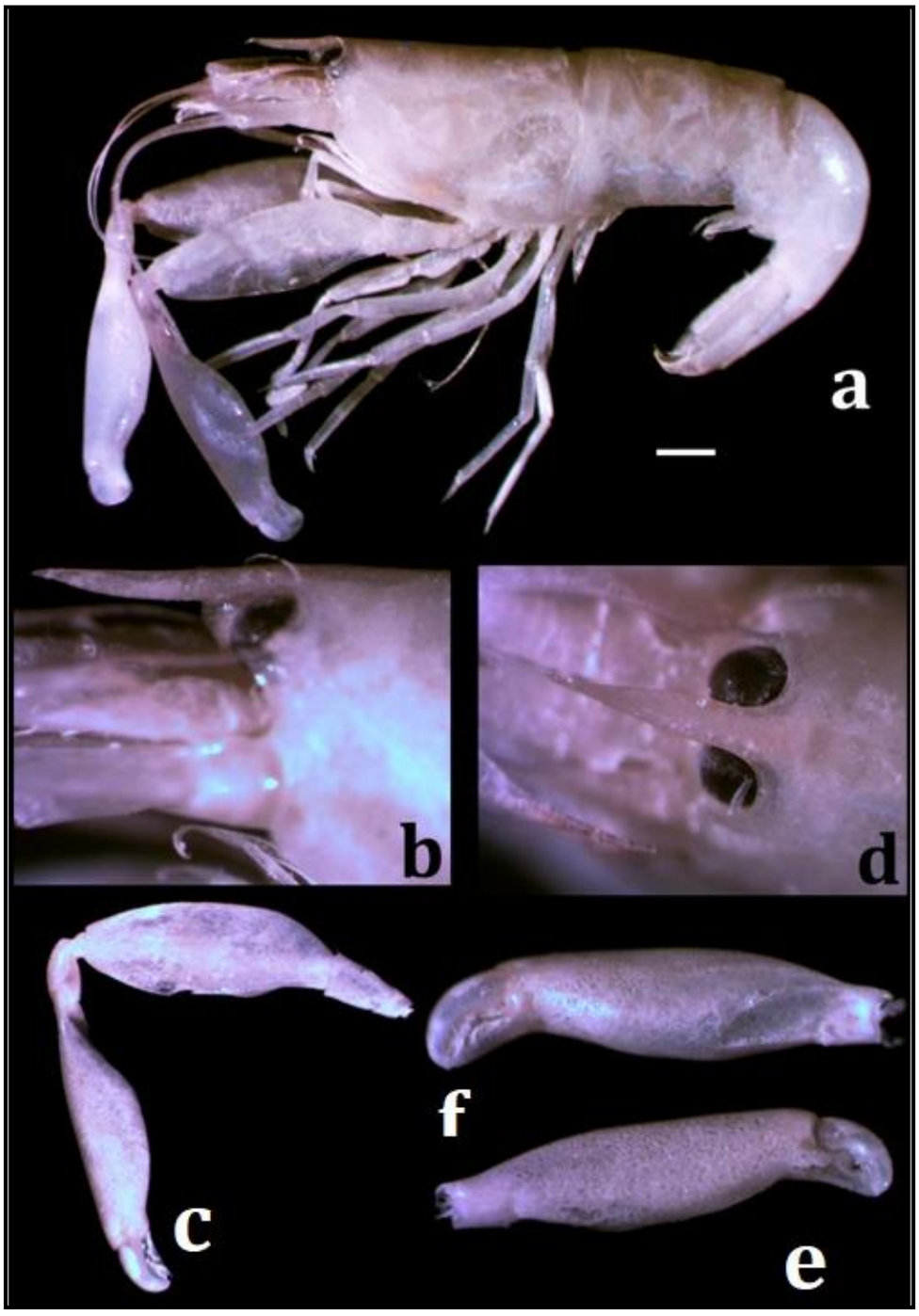

Figure 3.36 *Athanas dimorphus* Ortmann, 1894: a. Male dorsal view; b. &

d. carapace; c. First pereiopod; d. & e Chela of the first pereiopod. (Scale bar =1mm).

37. *Athanas parvus* de Man, 1910 (fig. 3.37)

Athanas sibogae De Man, 1910: 314.
Athana sparvus De Man, 1910: 315.

Material Examined- 1 male (TL-9.49 mm, CL-3.34 mm) (ZL-AR-PR-41), Pirotan Island, (22°36'05" N 69°57'29" E), Jamnagar District, 22 October 2015, coll. Barkha Purohit.

Diagnosis- Body small, Sparsely hairy; rostrum lanoceolate shaped, dorsal carina projecting straight forward, reaching up to distal end of second antennular segment; orbit without supracorneal tooth, acute infracorneal and extrcorneal tooth present, infracorneal tooth shorter than extracorneal; pterygostomial margin rounded; antennular segment sub equal; stylocerite sharp and extends up to second antennular segment; carpocerite reaching up to middle of third antennular segment; scaphocerite long, tip of lateral spine reaches up to distal rounded margin of lamella (fig. 3.37a); first to fourth abdominal segments posteriorly rounded; fifth abdominal segment pointed; sixth segment with a movable plate; P1 asymmetrical; major chelipeds of P1 stout with cylindrical chela; chela 3.6 times as long as broad; ischium almost 0.2 times as long merus; dactylus crescent shaped with a raw of irregular serrations on cutting edges; fixed finger with a huge rounded tooth; dactylus much longer than fixed finger and tips crossing (fig. 3.37b); merus slightly excavated at distal end, unarmed and equal to chela length; palm smooth andswollen, distal ventral margin slightly angled, inner surface of proximal portion engraved, width 1/3 of length; carpus cup-shaped, notch present on outer distal margin, and ventral margin angled, merus is about times longer than border; ischium triangular in cross section with 5 spines; moveable spines present on dorsal and ventral inner margin; P2 carpus subdivide into 5 segments; carpal ratio of P2 10:3:3:3:5; dactylus of P3 slender and biunguiculate, almost 1/3 times as long as propodus, dorsal hook 2.9 times

as broad as ventral hook; telson 4.3 times as long as broad from posterior margin.

Coloration- Not observed.

Zonation and habitat- This species has been collected from the coral reef area.

Distribution- This species is previously reported from the Indo-west Pacific Ocean, Red Sea, Madagascar to Japan, Indonesia, Australia, and Samoa (Anker and De Grave, 2016).

In India, the species is the first time recorded Pirrotan Island, Gujarat (present study).

Commercial/Ecological importance- No commercial value was observed as they are tiny in size. These shrimps play an important role in the food web.

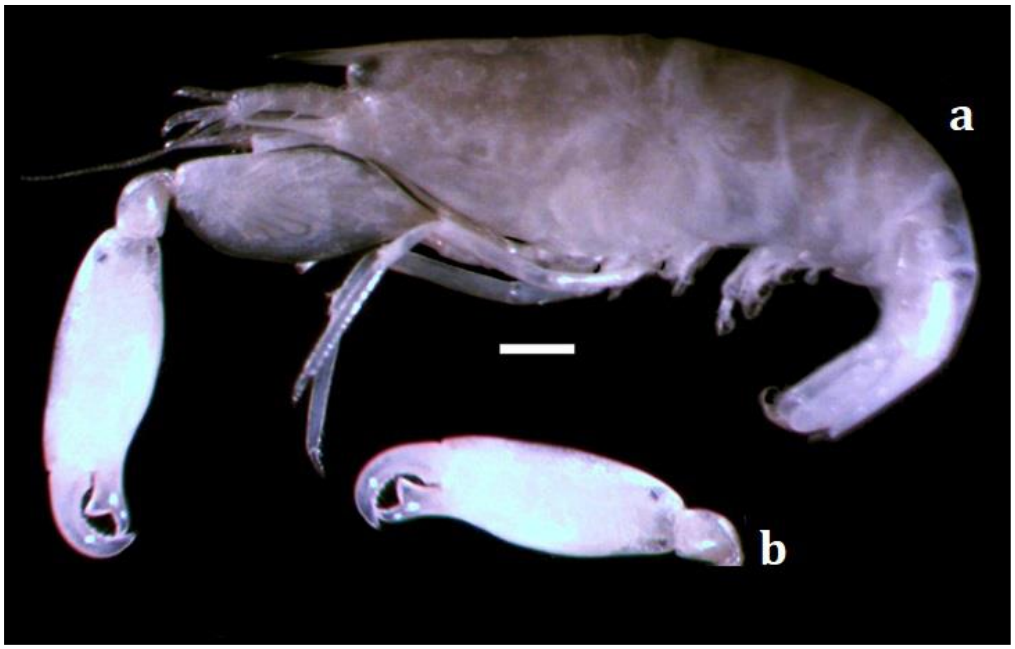

Figure 3.37 *Athanas parvus* de Man, 1910: a. Male lateral view; b. Chela of first pereiopod. (scale bar=1 mm).

Genus ***Synalpheus*** **Spence Bate, 1888**

Homaralphaeus Spence Bate, 1876: 378.

Homaralpheus Spence Bate, 1888: 1-942.
Zuzalpheus Ríos & Duff, 2007: 7.

Diagnosis- Body laterally compressed, front tridentate; rostrum short, rostrum short, vary in size and shape; eyes covered with carapace; orbital hoods well defined, separated from rostrum and antennal groove by more or less well-defined grooves; orbital spines present in front of orbital hoods, often equal in length to rostrum; first antennular segment longer than the others two; antennular scale well developed; distal segment of Mxp3 elongate, armed with strong spine at tip; pereiopods without epipodites; P1 and P2 chelated; P1 asymmetrical; carpus of major cheliped very short, propodus ovoid, smooth, dactylus short; carpus of minor cheliped elongate and cylindrical, entire palm smooth; carpus of P2 subdivided into five segments; first segment at least equal in length to sum of three following parts, second to fourth segments very small and subequal; dactylus of P3 to P5 either bifid and sometimes trifid.

38. *Synalpheus coutierei* Banner, 1953 (fig. 3.38)

Synalpheus coutierei Banner, 1953: 36; Banner and Banner, 1966: 62, fig. 20; Banner and Banner, 1975: 343, figs. 18a-i; Banner and Banner, 1978: 241; Banner and Banner, 1985: 41; Chace, 1988: 77.
Alpheus biunguiculatus de Man, 1888: 502, pl. 21, fig. 6; Spence Bate, 1888: 562, pl. 101, fig. 4.
Synalpheus biunguiculatus Coutière, 1898: 232, figs. 1-4; 1905: 873, pl. 71, fig. 8.
Synalpheus biunguiculatus var. exilipes Coutière, 1905: 874, fig. 10; Balss, 1921: 9.
Synalpheus exilipes Johnson, 1962: 51; Johnson, 1979: 43.

Material Examined- 1 male and 1 ovi. female (TL-11.70 mm, CL-4.75 mm; TL-13.52 mm, CL-4.92 mm) (ZL-AR-PR-48), Shivrajpur (23°36'14'' N 69°57'30'' E), Devbhumi Dwarka District, 14 April 2017, coll. Jignesh Trivedi. 1 male and 1 ovi. female (TL-13.38 mm, CL-5.42 mm; TL-13.66 mm,

CL-5.61 mm), Shivrajpur (23°36'14'' N 69°57'30'' E), Devbhumi Dwarka District, 23 May 2017, coll. Barkha Purohit.

Diagnosis- Body smooth, glabrous (fig. 3.38a); rostrum 2.3 times as long as broad at base, lateral margin slightly convex, reaching middle of visible part of first antennular segment; orbital hoods 2.2 times as broad at base as rostrum, length subequal to rostrum; tips of rostrum and orbital teeth rounded with bearing two short setae; V shaped notches formed between orbital hoods and rostrum; pterygostomial corner produced into blunt acute angle; cardiac notch well developed; antennular peduncle with distally acute stylocerite, reaching middle of second antennular segment; visible part of first antennular segment 1.5 times longer than second antennular segment; second antennular segment 1.7 times as long as broad; slightly longer than third antennular segment; scaphocerite blade narrow, overreaching to second antennular segment, lateral margin of lateral spine slightly concave posteriorly, reaching to end of third antennular segment; carpocerite reaching past end of antennular peduncle; inferior spine of basicerite subequal to stylocerite, superior spine acute and prominent, reaching up to end of rostrum; stylocerite with narrow lateral spine reaching middle of second antennular segment; abdominal segment smooth, glabrous (fig. 3.38b); Mxp3 reaching far beyond antennular peduncle; antepenultimate segment longest, about 5.5 times as long as broad; penultimate segment about 1.6 times as long as broad at base; tip of ultimate segment with 5-6 spine-like setae, with 7-8 transverse rows of setae along inferior margin (figs. 3.38i & j); major chela of P1 2.5 times as long as wide, fingers occupying distal 0.3; ischium stout; merus 2.3 times as long as broad; carpus cup-shaped, with long setae distodorsally; superior margin of palm terminating in subacute tubercle above dactylar articulation; inferior margin inermous; palm 2.4 times as long as dactylus; dactylus heavy, longer than fixed finger (figs. 3.38d & e); minor chela 2.8 times as long as broad; inferior margin of ischium with long setae; merus about 3.2 times as long as broad, supero-distal margin rounded, without any projecting, inferior margin bearing short setae;

carpus cup-shaped proportionally longer than that of major chela; palm about 1.8 times as long as fingers, lateral face near dactylus bearing patch of stiff setae; dactylus tapering, with inferior margin concave, distal single tooth, lateral margin with row of long setae; fixed finger tapering, with inferior surface obliquely convex, distal single tooth, lateral margin bearing row of long setae (figs. 3.38f & g) ; P2 slender, ischium shorter than merus; carpus subdivide into five segments, first segment shorter than sum of other four segments, ratio of carpal segment (from proximal to distal) approximately equal to 10: 2: 2: 2: 4; finger 1.1 times as long as palm (fig. 3.38h); merus of P3 longer than propodus, about 4 times as long as broad at base, without spines on ventral margin; carpus shorter than merus, dorsal margin extended into obtuse tooth, ventral margin with one distal spine; propodus almost as long as merus, bearing seven spines on ventral region and a pair of distal spines near dactylus; dactylus 0.14 times shorter than propodus length, bi-unguiculate, moderately slender, superior tooth subequal to inferior tooth; superior tooth as broad as flexor at base; U shaped notch between superior and inferior tooth; telson about 1.3 times as long as broad at base; lateral sides slightly concave posteriorly; dorsal surface with two pairs of large spines, median groove present; posterior margin strongly convex, fringed with long setae, each posterolateral angle with two pairs of spines, lateral ½ length of mesial, posterolateral corner right angle.

Coloration- The whole body is semitransparent. Green-yellowish chromatophore present on cephalothorax and abdomen. Eggs are yellow-greenish.

Zonation and Habitat- This species has been collected from the internal canals of an unidentified sponge.

Distribution-This species is distributed along the Indo-west Pacific, from the Red Sea to Japan, Indonesia, Micronesia, Solomon Islands, and Australia (Anker and De Grave, 2016)

In India, the species is previously reported from both East and West coast: Gujarat (present study) and Gulf of Mannar (Banner and Banner, 1979).

Commercial/Ecological importance- No commercial value was observed as they are very tiny in size. These shrimps play an important role in the food web.

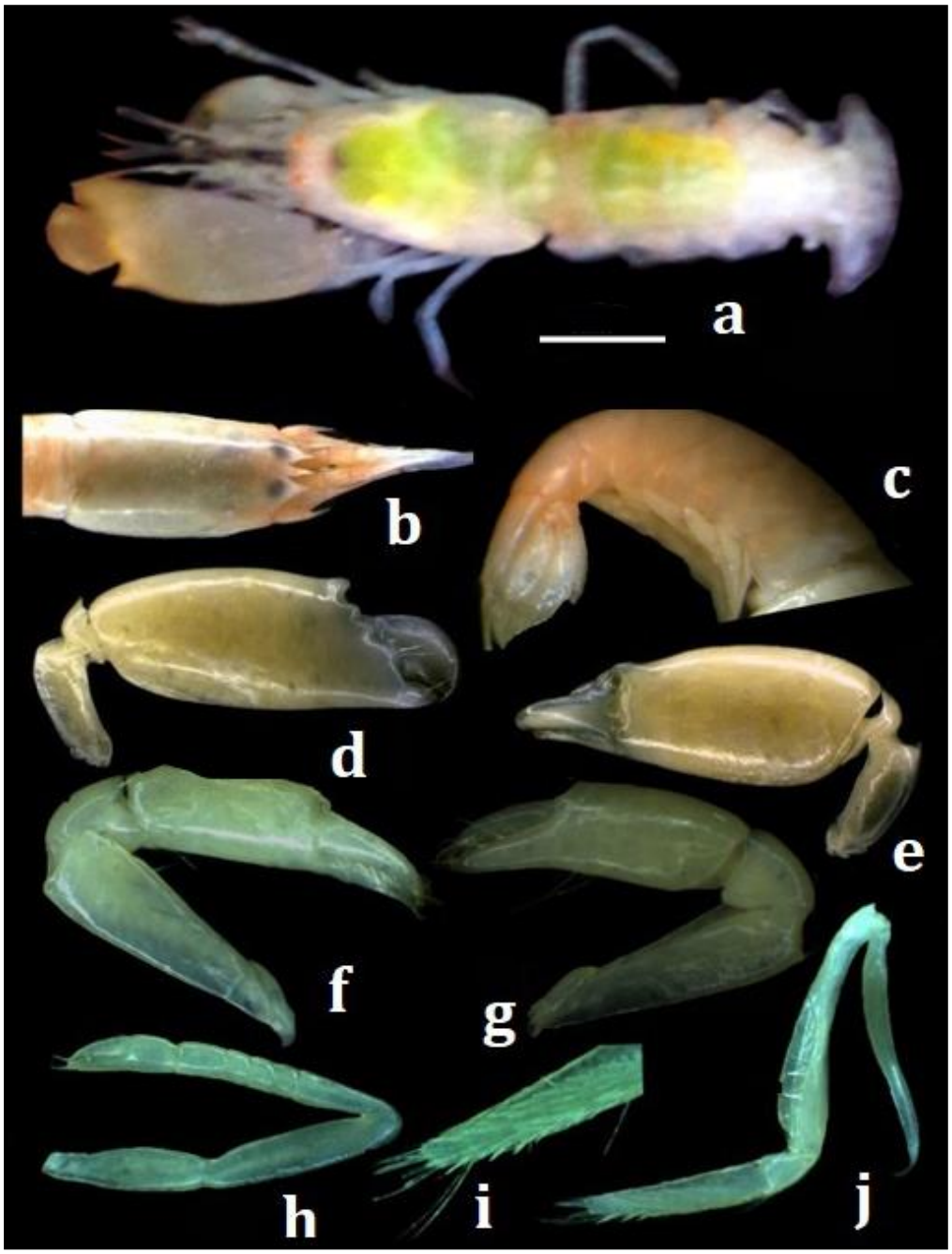

Figure 3.38 *Synalpheus coutierei* Banner, 1953: a. Ovi. female dorsal view; b. Carapace; c. Abdomen; d. &e. Major chela; f. & h. Small chela; h. Second pereiopod; i. Third maxilliped tip; j. Third maxilliped. (Scale bar =4 mm).

Family **Hippolytidae Stebbing, 1915**

Diagnosis- Carapace with or without spine; rostrum well developed; eyes visible, not covered by carapace; midline without dentate crest at the base of rostrum; pereiopod equal, P1 short and rather dense but not swollen; carpus of P2 subdivide into many segments; P1and P2 chelated, tips of fingers usually dark-colored; telson not tapering, sharp to posterior point.

Key to the genera of the family Hippolytidae occurring in India (in Gujarat*)

1.Third segment of antennular peduncle without subtriangular dorsal scale; carapace with antennal tooth **2**

2. Mxp3 without exopod; carpus of P2 with three segments ..... ***Tozeuma***

—Mxp3 with exopod **3**

3. Carapace without supra-orbital; with antennal spine; carpus of P2 with three segments ..... ***Paralatreutes***

—Carapace with supra-orbital; without antennal spine; carpus of P2 with two segments ..... ***Phycocaris***

4. Postrostral spine fixed; Mxp1 with caridean lobe merging gradually into exopodite; Mxp3 with coxal exite; carpus of P2 with 13-16 segments ..... ***Merhippolyte***

—Post-rostral spine movable; Mxp1 with caridean lobe discrete from exopodite lash; Mxp3 without coxal exite; carpus of P2 with about 90 segments ..... *Eumanningia*

5. Sixth abdominal somite with a movable plate articulated near posteroventral angle ..... ***Saron****

—Sixth abdominal somite without a movable plate articulated near posteroventral angle; carpus with branchiostegal margin denticulate ..... ***Latreutes****

Genus ***Latreutes*** **Stimpson, 1860**

Concordia Kingsley, 1880: 383-427, plt. 14.

Cyclorhynchus De Haan, 1849: 1-31, plts. A-J, L-Q, 1-55.

Platybema Spence Bate, 1888: 1-90, 1-942, plts. 1-150.
Rhynchocyclus Stimpson, 1860: 22-47.

Diagnosis- Rostrum well developed, deep, variable and sexually dimorphic; supraorbital spine present; mandibles without palp and incisor process; Mxp3 with exopod; sixth abdominal somite without articulating posterolateral region; pereiopods without arthrobranchs; carpus of P2 divided into three segments.

39. *Latreutes anoplonyx* Kemp, 1914 (fig. 3.39)

Latreutes anoplonyx Kemp, 1914: 104-105, plts. 4, figs. 3-5.

Materials Examined- 3 females (TL- 3.4 cm, CL-1.8 cm; TL-3.5 m, CL-1.87 cm; TL- 3.5 cm; CL-1.92cm) (ZL-AR-PR-40), Fish landing center, Jakhau (23°14'05.87" N 68°36'37.32" E), Kachchh District, 29 April 2016, coll. Barkha Purohit. 2 males (TL-3.2 cm, CL-1.6 cm; TL-2.8 cm, CL-1.67) Pingleshwar (23°03'55.07" N 68°48'02.86" E), Kachchh District, 1 May 2016, coll. Barkha Purohit.

Diagnosis- Carapace smooth, not carinated mid dorsally (fig. 3.39a); rostrum triangular, overreaching beyond antennular scale apex or more than ¾ length of carapace; tip sharp and upwards; dorsal margin concave and armed with fourteen dorsal teeth (2/3 of rostrum length); ventral margin armed with nine teeth in distal half and evenly curved; epigastric tooth present; antennal spine strong; a series of small spines presents on anterolateral angle which varies between eight to eleven (figs. 3.39a & b); eyes small, reaching up to first segment of abdominal peduncle, short, about 1/3 times as long as carapace, small marginal spine present on first segment; stylocerite broad and rounded; antennal scale about 4.0 times as long as broad; spine present on anterolateral side of basal segment; Mxp3 overreaching up to central of antennal scale; ultimate segment more than twice of antepenultimate segment; parapenultimate segment 0.5 times longer than ultimate segment, ultimate segment with eight to nine hornlike spines at distal end (fig. 3.39c); abdomen smooth, sixth segment 0.6–0.8

times as long as telson (fig. 3.39d); epipods present on P1 to P4; P1 robust and shorter than other (fig. 3.39e), reaching up to first antnnular segment; dactylus shorter then palm; P2 slender and reaching up to middle of rostrum; dactylus slightly shorter then palm; carpus three segmented, first segment about half of second segment, and slightly longer then third segment; P3 longer than other pereiopods; reaching more than distal margin of antennal part; propodus about 3.5 times longer than dactylus; 3-5 spinules present on margin; propodus with 5-6 spinules present on propodus; spine present on distolateral margin of merus; P4 structure similar to P3; sixth abdominal somite almost 0.6 times as long as telson and 1.5 times of fifth smoites; telson with two pairs of dorsal spines and posterior margin acute with two pair of spines; outer spines larger than inner; telosn shorter then uropods; movable spine present, situated on exopod of uropods with a suture (fig. 3.39f) .

Coloration- The whole body is light pinkish brown. The rostrum tip and the posterior region are colorless. The distal half is dark reddish. Red color dotes present on pereiopods. The abdominal segment with transverse white bands and dark red dotes are present in the posterior region. The sixth abdominal segment is colorless.

Zonation and Habitat- This species has been collected from trawl catches at a depth of 15 m. This species is found in the association with jellyfish (*Phyllorhiza punctata*, *Versuriga anadynomene*, *Phyllorhiza,* and *Versuriga*) (Bruce, 1995).

Distribution- This species is previously reported from the Indo-west Pacific, from India to Japan, Indonesia, and Australia (Anker and De Grave, 2016).

In India, the species is previously reported from the West coast: Maharashtra (Kemp, 1914).

Commercial/Ecological Importance- These shrimps are commercially valuable.

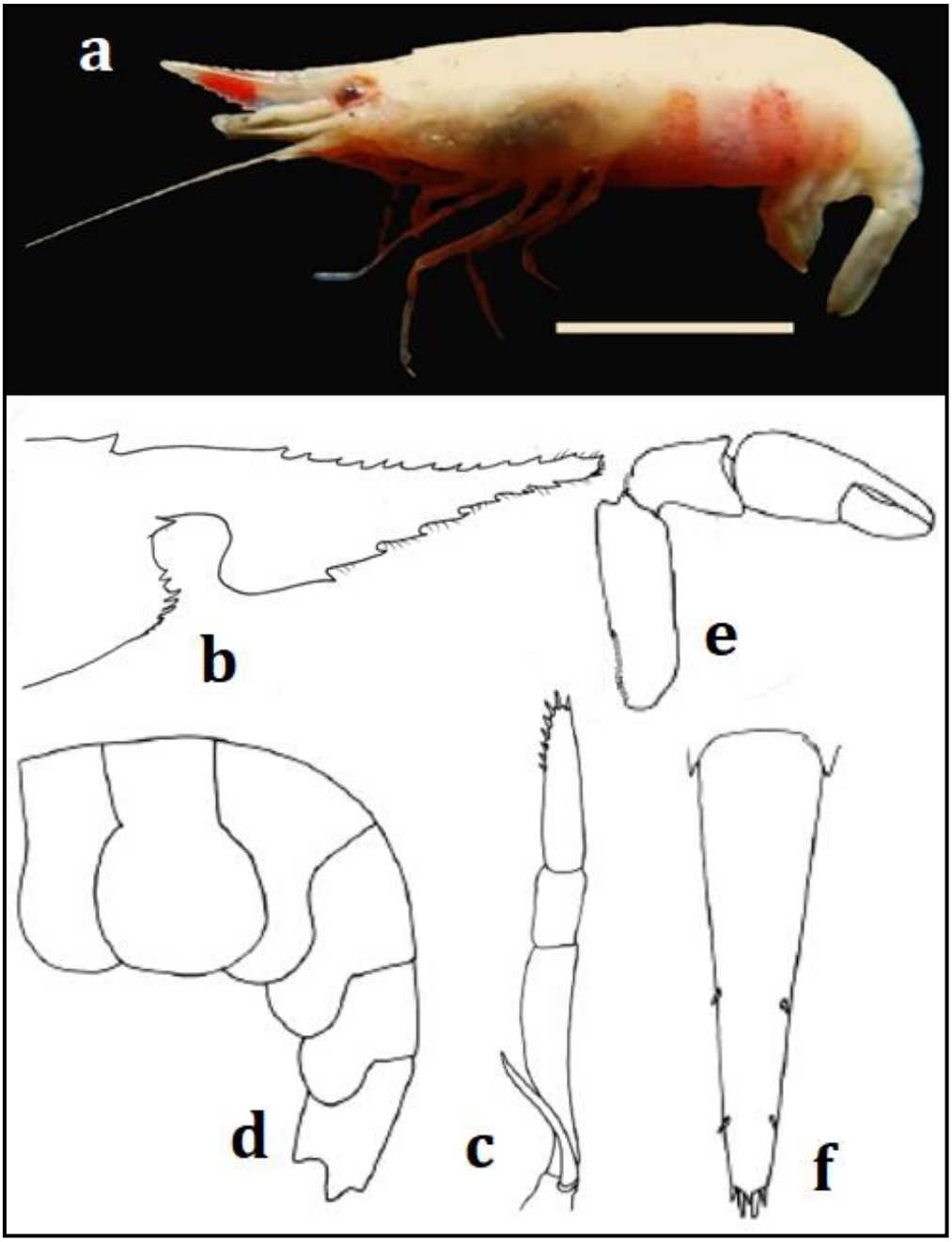

Figure 3.39 *Latreutes anoplonyx* Kemp, 1914: a. Ovi. female lateral view; b. Carapace; c. Third maxilliped; d. Abdominal segments; e. First pereiopod; f. Telson. (Scale bar =1cm).

Genus ***Saron*** **Thallwitz, 1891**

Diagnosis- Rostrum prominent, deep, tooth present on dorsal and ventral both sides; supraorbital spine not present; mandibles with three articled palp with incisor process; Mxp3 with exopod, epipod, and arthobranch; P1

to P4 with arthobranches; carpus of P2 divided into many segments; sixth abdominal somite with movable plate articulating posterolateral margin.

40. *Saron marmoratus* (Olivier, 1811) (fig. 3.40)

Hippolyte gibberosus H. Milne Edwards, 1837: 638, plts. 1-42.
Hippolyte hemprichii Heller, 1861:3-31
Hippolyte leachii Guérin-Méneville, 1838: 1-47, plts. 1-5
Hyppolite kraussii Bianconi, 1869:99-222, plts. 1-4.
Nauticaris grandirostris Pearson, 1905:65-92, plts. 1-2.
Palaemon marmoratus Olivier, 1811:656-670.

Materials Examined- 2 females (TL-5.0 cm, CL-2.7; TL-6.2 cm, CL-3.3 cm) (ZL-AR-PR-51), Shivrajpur (23°36'14''N 69°57'30''E), Devbhumi Dwarka District, 14 April 2017, coll. Barkha Purohit. 1 ovi. female (TL-6.2 cm, CL-3.1 cm), Veraval (20°54'43.23'' N 70°20'58.69'' E), Gir Somnath District, 7 April 2017, coll. Barkha Purohit. 1 male and 1 female (TL-2.6 cm, CL-1.25 cm; TL-5.7 cm, CL-3.2 cm), Sutrapada (20°49’55.5” N 70°29’16.54” E), Gir Somnath District, 19 March 2016, coll. Barkha Purohit.

Diagnosis- Rostrum usually large, longer than carapace, strongly curved upward, bearing 7 dorsal and 6 ventral tooth; antennal, small branchiostegal and feeble pterygostomian spines present on carapace with single orbital margin; branchiostegal spine present much nearer to middle point of anterolateral margin than pterygostomian spine; several tufts of plumose hairs present; those studded with one row on dorsal carina of carapace and two rows along dorsal medial line of abdomen are long and dense (figs. 3.40a & b); maximum postorbital carapace length about 13 mm; antennular peduncle without erect spine on third segment; antennal peduncle with basicerite lacking prominent distoventral tooth; P1 normally, reaching midpoint of antennal scale; chela almost 1.5 times as long as carpus; P2 slender, reaching distal part of antennal scale; cutting edge of dactylus smooth without serration; carpus subdivided into nine to 9-13 segments (fig. 3.40d); P3 to P5 with similar structure (figs. 3.40e, f & g); equally armed with two well-visible spines on subterminal portion of

merus; two spines present on merus of P3 and P4; one spine present on merus of P5; propodus well developed; appendix interna present on endopods of Plp2 to Plp5; Plp4 with appendix interna attached to endopod over much of length; telson with two pairs of dorsal spines; posterior margin with three large and two small spines (fig. 3.40h).

Coloration- The Carapace and abdomen are brown-black with purple-centered roseate spots of different sizes and formed a mottled pattern. The anterior margin of the carapace is pale yellow with brownish irregular crescentic markings. On the dorsal abdomen, roseate-ringed yellowish blotches are present. The antennular and antennal flagella are dark reddish-brown with whitish rings, and the antennal scale is dark reddish-brown, distally mottled white. The maxilliped and all pereiopods are pale yellows with regularly ringed by brown bordered bluish and yellowish bands.

Zonation and Habitat- This species has been collected from the shallow coral reef region.

Distribution- This species is previously reported from the Indo-west Pacific, from the Red Sea and South Africa to Japan and French Polynesia (Anker and De Grave, 2016).

In India, the species is previously reported from the East and West coast: Gujarat (Radhakrishnan et al., 2012), Lakshadweep (Baby et al., 2016), and West Bengal (Radhakrishnan et al., 2012).

Commercial/Ecological Importance- These shrimps are highly priced in the marine aquarium trade as an ornamental species.

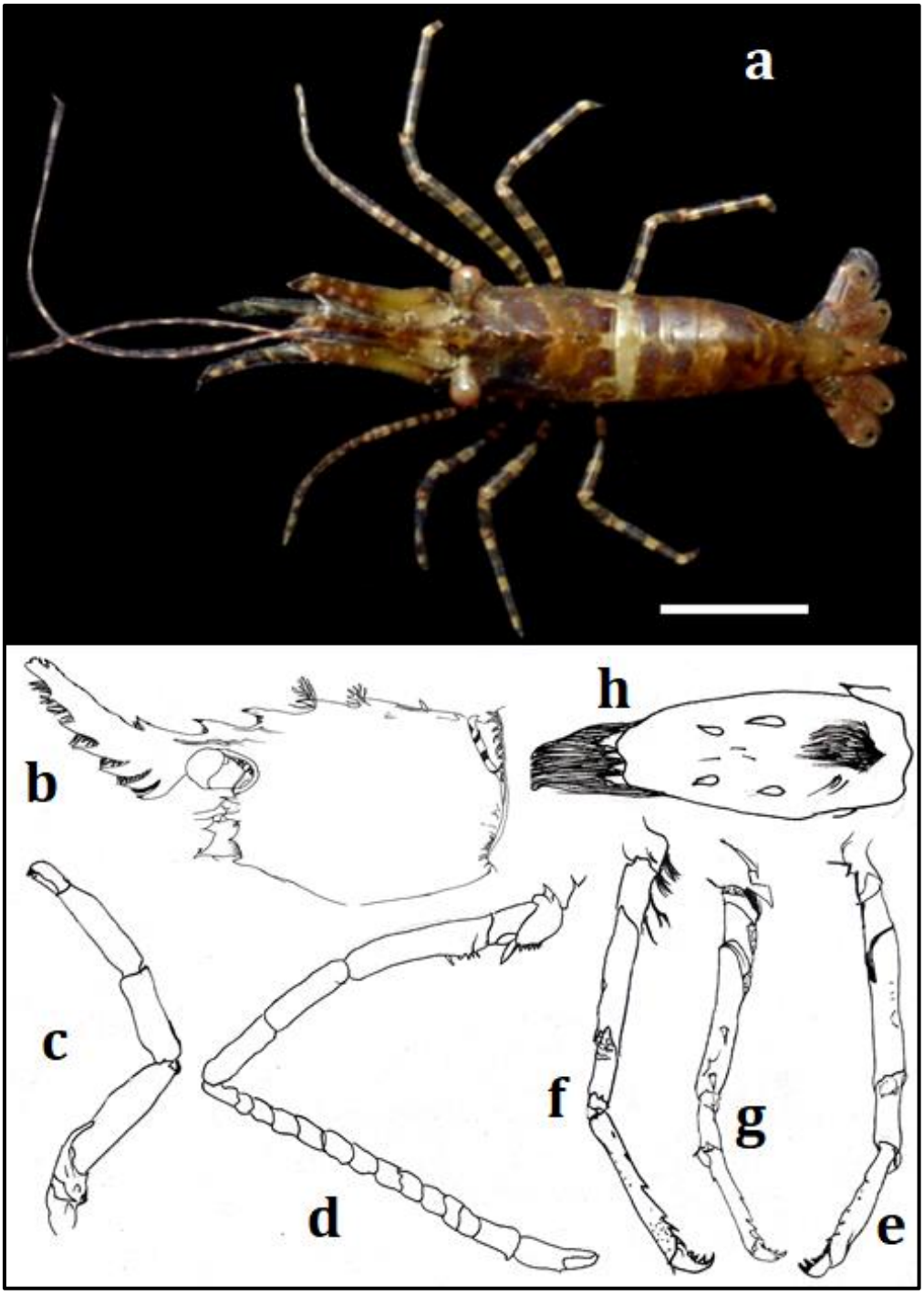

Figure 3.40 *Saron marmoratus* (Olivier, 1811): a. Ovi. female lateral view; b. Carapace; c. First pereiopod; d. Second pereiopod; e. Third pereiopod; f. Fourth pereiopod; g. Fifth pereiopod; h. Telson. (Scale bar =1cm).

Family **Lysmatidae Dana, 1852**

Diagnosis- Rostrum well developed with dorsal and ventral tooth; as long as last segment of antennule peduncle; with antennular flagella long, as long as body or more when intact; first four pairs of pereiopod (P2 to P5)

without arthobranches; P1equal with chelate chela; P2 unequal, carpus of P2 with more than twenty segments; sometimes propodus of last three pairs of pereiopods (P3 to P5) subdivide into two segments.

Key to the genera of the family Lysmatidae occurring in India (in Gujarat*)

1.Carapace with dentate groove in midline at rostrum base …… ***Exhippolysmata**** —Carapace without dentate groove in midline at rostrum base **2**
2.Four anterior pairs of pereiopods with epipod ..... ***Lysmata****

Genus ***Exhippolysmata*** Stebbing, 1915

Diagnosis- Integument not rigid; rostrum overreaching antennular peduncle, armed with dorsal and ventral tooth, without ventral blade from ventrally lateral carina; carapace with dentate crest in midline at base of rostrum; antennal and pterygostomian teeth present, but without supraorbital tooth; abdomen with first pleura, entire not bifurcate, fifth pleuron posteroventrally acute, not denticulate; sixth abdominal somite without prominent spines; telson tapering to sharp posterior end, bearing two pairs of dorsolateral spines.

41. *Exhippolysmata ensirostris ensirostris* (Kemp, 1914) (fig. 3.41)

Hippolysmata ensirostris Kemp, 1914: 81-129, plts. 1-7

Materials Examined- 1 female (TL-8.5 cm, CL-4.3 cm) (ZL-AR-PR-22), Fish landing center, Hazira (21°05'56.02" N 72°36'56.67 E), Surat District, 3 November 2017, coll. Barkha Purohit and Rashmi Pal. 3 females (TL- 9 cm, CL-4.3 cm; TL-8.9 cm, CL-4 cm; TL-9.2 cm CL-4.2 cm), Tithal, (20°36'02.22" N 72°53'32.16" E), 26 October 2017, coll. Barkha Purohit. 1 male (TL- 9.2 cm, CL-4.1 cm), Vansi Borsi (20°55'46.70" N 72°48'12.84" E), Navsari District, 26 February 2018, coll. Barkha Purohit. 1 female (TL-8.5 cm, CL-4.27 cm), Fansa (20°20'23.82" N 72°47'43.03" E), Valsad District, 7 November 2017, coll. Barkha Purohit. 2 females (TL- 9 cm, CL-4 cm; TL-9.2

cm, CL-4.1 cm), Salaya (22°19’05.87” N 69°36’03.17” E), Devbhumi Dwarka District, 26 February 2017, coll. Barkha Purohit. 2 females (TL-8.7 cm, CL-4.5 cm; TL-8.2 cm, CL-4 cm), Daman (20°24’11.47” N 72°49’48.75” E), Union Territory, coll. 28 February 2017, coll. Barkha Purohit.

Diagnosis- Body smooth, glabrous; carapace smooth and pitted, long and longer than carapace**,** rostrum long, far exceeding distal margin of antennal scale, dorsal margin with an elevated crest of 7-12 teeth, rest of dorsal margin with 3-4 spaced teeth, 7-16 teeth armed on ventral side; antennal spine present; pterygostomian spine present; cornea well developed (figs. 3.41a & b); Mxp3 with exopod; fifth abdominal pleura sharply pointed (fig. 3.41c); P1 (fig 3.41e) to P4 with rudimentary epipods; P2 with a small pincer, carpus subdivide into more than seven segments (fig. 3.41f); dactylus of last three pereiopods (P3 to P5) much shorter than propodus; telson tapering rapidly to sharp apex posteriorly, lateral margin of concave; two pair of moveable dorsolateral spines present, without moveable spines posteriorly near tip.

Coloration- The entire body is whitish or pinkish with the appendages (especially the Mxp3, pleopods, and uropods) red, often dark red. Rostrum and flagella are also reddish.

Zonation and Habitat- This species has been collected from trawl catches at a depth of 5 to 9 m.

Distribution- This species is previously reported from the Indo-Pacific, India, Sri Lanka, Akyab, Myanmar, Sumatra, Java, and Indonesia (Kazmi and Kazmi, 2010).

In India, the species is previously reported from both East and West coast: Gujarat, Maharashtra, Andhra Pradesh, Tami Nadu, and West Bengal (Radhakrishnan et al., 2011).

Commercial/Ecological Importance-This species is of high commercial importance in the fisheries industry and marketed as mainly fresh and frozen seafood.

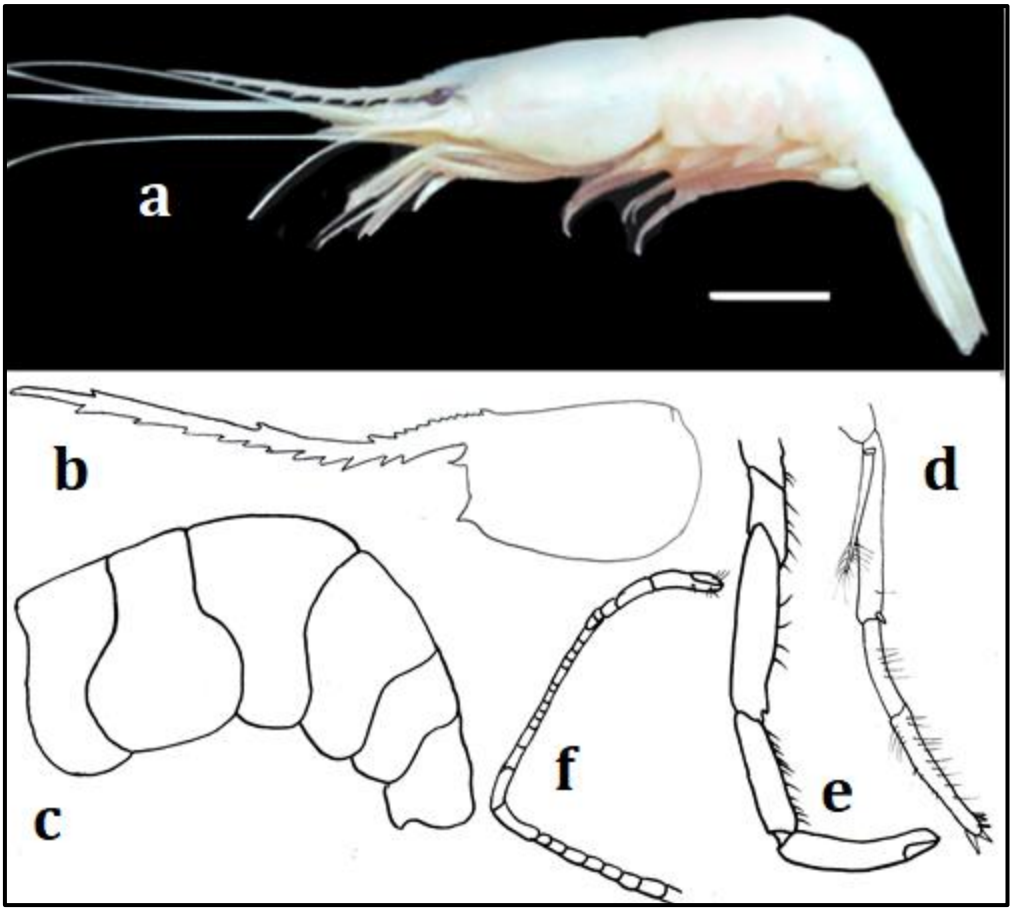

Figure 3.41 *Exhippolysmata ensirostris ensirostris* (Kemp, 1914): a. Ovi. female lateral view; b. Carapace; c. Abdomen; d. Third maxilliped; e. First pereiopod; f. Carpus of the second pereiopod. (Scale bar =1cm).

Genus ***Lysmata*** **Risso, 1816**

Diagnosis- Integument not rigid; rostrum armed with dorsal and ventral teeth; without ventral blade extending vertically from lateral carina; carapace not inflated, not abruptly depressed on frontal region, without dentate crest in midline at base of rostrum, without a supraorbital tooth, hepatic tooth and branchiostegal tooth or denticles but with marginal, unarticulated antennal tooth and occasionally, pterygostomian tooth; abdomen with first pleuron entire, not bifurcate; sixth somite without prominent spines, without articulated plate at posteroventral angle and pleuron not curving around base of uropods; telson not tapering to sharp posterior end, posterolateral angles not sharply produced, bearing two pairs of dorsolateral spines.

42. *Lysmata vittata* (Stimpson, 1860) (fig. 3.42)

Hippolysmata durbanensis Stebbing, 1921: 12-26, plts. 1-5.

Hippolysmata vittata Stimpson, 1860: 22-47.

Hippolysmata vittata var. subtilis Thallwitz, 1891: 1-56.

Nauticaris unirecedens Spence Bate, 1888: 1-90, 1-942, plts. 1-150.

Material Examined- 2 males and 3 ovi. females (TL-19.91 mm, CL-6.78 mm; TL-29.72 mm, CL-11.97 mm; TL-28.17 mm, CL-9.68 mm; TL-27.50 mm, CL-9.56 mm; TL-25.72 mm, CL-8.82 mm) (ZL-AR-PR-24), Shivrajpur (23°36'14''N 69°57'30''E), Devbhumi Dwarka District, 14 April 2017, coll. Barkha Purohit and Swapnil Gosawi.

Diagnosis- Rostrum shorter than carapace without elevated crest, not overreaching up to the end of second antennular peduncle; spine pteserostral formula 2-3 + 2-5/1-5 (teeth present on both ventral and dorsal side); epigastric, antennal and pterygostomian spines present on carapace; antennule with stylocerite reaching about to mid-length of basal segment, dorsal flagellum without accessory branch (figs. 3.42a & b); antennal scale reaching about as far as end of antennular peduncle, about 3 times as long as broad, distolateral tooth reaching about as far as distal margin of blade, second segment about half the length of first segment; third one a third as long as first segment (fig. 3.42c); Mxp3 with exopod reaching entirely as far as mid-length of antepenultimate segment; first cheliped surpassing distal end of antennular peduncle by major part of dactylus; merus four times as long as broad at middle; carpus about 0.6 times of merus length; palm a little shorter than carpus; fingers 0.6-0.8 times as long as palm, meeting when closed in distal about two-thirds (figs. 3.42d & e); P2 slender; ischium and merus sub-equal in length, merus composed of segments; carpus about twice as long as merus, made up of 19-22 segments (fig. 3.42g); P3 extending beyond tip of antennular peduncle by distal half of carpus and last two segments; ischium 0.65, merus 2.1, propodus 1.1, dactylus 0.28 in proportion to carpus in length; merus somewhat shorter than carapace, about 1.2 times as long as broad,

armed with four spinules on distal half of outer surface along infero-lateral edge; dactylus carries four or five spinules on ventral margin; P4 and P5 similar to P3 in general configuration, more or less shorter than third one, stretching beyond tip of antennular peduncle by distal half of propodus and entire dactylus; P5 equals to P4 in length, with two or three meropoditic spines; lateral margin of telson convex; apex of telson blunt with a pair of spine.

Coloration- The whole body is semitransparent with narrow longitudinal bright red bands.

Zonation and Habitat- This species has been collected from the coral reef region, rocky, and mixed rock-sand-rubble substrates.

Distribution-This species is distributed along the Indo-west Pacific, from East Africa to Japan, Australia, and New Zealand (Anker and De Grave, 2016).

In India, the species is previously reported from both East and West coast: off Maharashtra (Kuriyan, 1951), Kerala (Pillai, 1966), Tamil Nadu (Gravely, 1930), and Andaman Islands (Kemp, 1916).

Commercial/Ecological Importance- *Lysmata vittata* is one of the most attractive and extensively traded species in the marine ecosystem in terms of the marine aquarium industry (Calado, 2008).

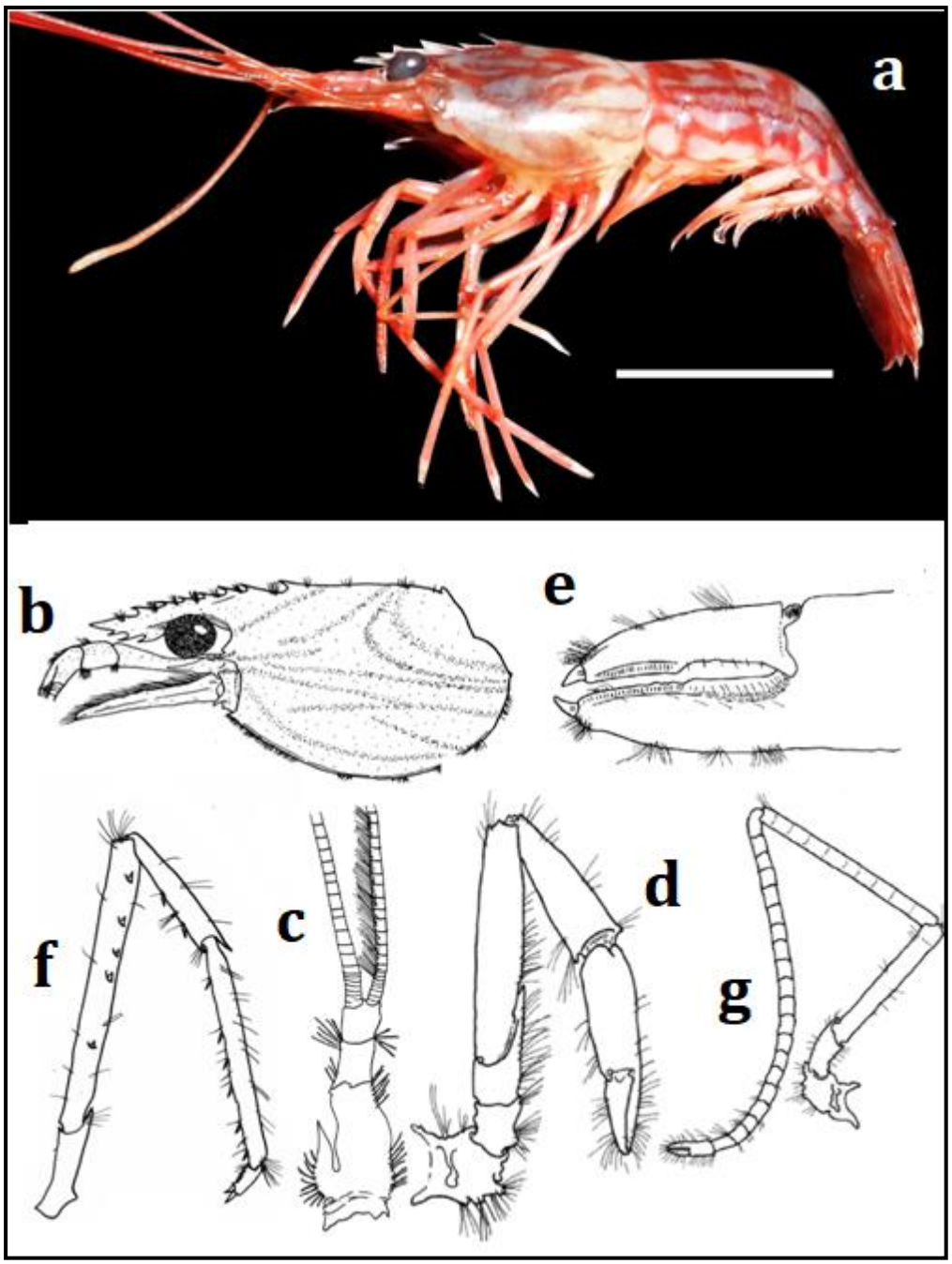

Figure 3.42 *Lysmata vittata* (Stimpson, 1860): a. Ovi. female lateral view; b. Carapace; c. Antennule; d. First pereiopod; e. Chela of first pereiopod f. Right third pereiopod; h. Second pereiopod. (Scale bar =1cm).

Family **Thoridae Kingsley, 1879**

Diagnosis- Carapace with antennal, pterygostomian spine often present; 0-4 times supraorbital teeth; dorsal flagellum of antennule short; very stout in adult, with proximal articles annulated and bearing many closely spaced olfactory hairs, forming brush-like appearance; second segment of

antennular peduncle with a sharp curved lateral tooth in adult; Mxp3 with setose and small claws at end of terminal segment; third segment of antennular peduncle with sharp dorso-distal tooth in adult; carpus of P2 with seven segments.

Key to the genera of the family Thoridae occurring in India (in Gujarat*)

1. Third segment of antennular peduncle with subtriangular dorsal scale; reduced rostrum with two or more teeth, adult males with normal P1 and P2 with appendix masculine ..... ***Thor*** *

—Third segment of antennular peduncle with subtriangular dorsal scale; rostrum short with a single dorsal tooth, in adult males P1 usually sexual dimorphism of P1, appendix masculine completely absent ..... ***Thinora***

Genus *Thor* Kingsley, 1878

Diagnosis- Integument not rigid; rostrum not overreaching antennular peduncle, armed dorsally with 28 teeth, ventrally with 0-2, without ventral blade, without tongue-like lobe extending ventrally from lateral carina; carapace without discrete dentate crest in midline at base of rostrum, without longitudinal, lateral carina, without appressed teeth on lateral surface, without abrupt depressions on frontal or orbital regions, without subocular tooth posterodorsal to orbital angle, latter not large, with antennal spine, latter not basally articulated, without hepatic spine, without branchiostegal spine or denticles, usually without pterygostomian spine; abdominal somites not dorsally carinate or postero-mesially dentate; eyestalk movable, not concealed by carapace, cornea with ocellus; antennule with stylocerite often lying in vertical plane, not bifid or semicircular; third peduncular segment with movable dorso-distal plate; dorsolateral flagellum stout, brush-like; antennal peduncle seldom overreaching antennular peduncle, not armed with 3 strong ventral spines; antennal scale overreaching antennular peduncle, without lateral tooth near mid-length or small movable lateral spines. Mandible without palp,

with incisor process; Mxp1 with caridean lobe usually discrete from exopodite, epipod bilobate; Mxp2 with terminal segment elongate triangularly and applied somewhat diagonally to preceding segment, exopod not unusually wide; Mxp3 with distal segment not flattened, with exopod, usually with epipod and coxal endite, without arthrobranch; pereiopods without exopods, epipods, or arthrobranches; P1 fingers shorter than palm, not terminating in interlocking spines, P2 symmetrical, fingers shorter than palm, carpus subdivided into six (or 7) segments; P3 dactylus and propodus prehensile in functional males; P4 and P5 dactylus not gradually tapering to acute apex, biunguiculate, armed with spines proximally on flexor margin, propodus not subdivided; uropod with lateral margin of lateral branch terminating in fixed tooth with longer, movable spine mesial to it; telson not tapering gradually to a sharp point, posterolateral angles not sharply produced.

43. *Thor amboinensis* (de Man, 1888) (fig. 3.43)

Hippolyte amboinensis de Man, 1888: 215-600, plts. 8-22a.
Thor discosomatis Kemp, 1916: 386-405, plt. 36.

Material Examined- 3 males, 2 females, and 2 ovi. females (TL-6.10 mm, CL-2.08 mm; TL-7.33 mm, CL-2.46 mm; TL-6.61 mm, CL-2.05 mm; TL-8.31 mm, CL-2.59 mm; TL-9.79 mm, CL-3.15 mm; TL-8.37 mm, CL-2.47 mm; TL-7.35 mm, CL-2.37 mm)(ZL-AR-PR-58), Pirotan Island (23°36'14" N 69°57'30" E), Marine National Park, Jamnagar District, 22 October 2015, coll. Barkha Purohit.

Diagnosis- Carapace moderately inflated, rostrum reaching to middle of antennular peduncle, apically acute, bearing two dorsal spines; small acute antennal spine, pterygostomial spine absent; stylocerite of basal segment of antennule reaching almost to end of peduncle; short spine on outer proximal edge of stylocerite (figs. 3.43a & b), more easily visible in lateral view than in dorsal view; second segment with outer spine at distal end, third segment with broad movable scale; antennal scaphocerite twice length of antennular peduncle; P1 stout, reaching almost too same level as

scaphocerite (fig. 3.43d); P2 reaching to end of Mxp3, carpus divided into six segments, proximal two segments short, less obvious than rest of segments (fig. 3.43e); P3 longest, extending beyond end of Mxp3, merus with single disto-ventral spine; dactyls of P3 to P5 with stout apical and sub-apical claw and three spines (figs. 3.43f, g, & h); basal segment of pleopods, especially two and three with posterior foliaceous extension; telson with four pairs of dorsolateral spines, four pairs of terminal spines of which

Coloration- Coloration of the specimens was not observed.

Zonation and Habitat- This species lives symbiotically on corals, sea anemones, and other marine invertebrates in shallow reef communities.

Distribution- This species is previously reported from the Indo-Pacific Ocean, Persian Gulf, South Africa to the red sea, Caribbean Sea (Chace, 1972).

In India, the species is previously reported from the East coast: Bay of Bengal, Andaman, and Nicobar Island (Kemp, 1916; 1925).

Commercial/Ecological Importance- They feed on tentacles (corals and sea anemones) and mucus-trapped planktonic particles adhering to them.

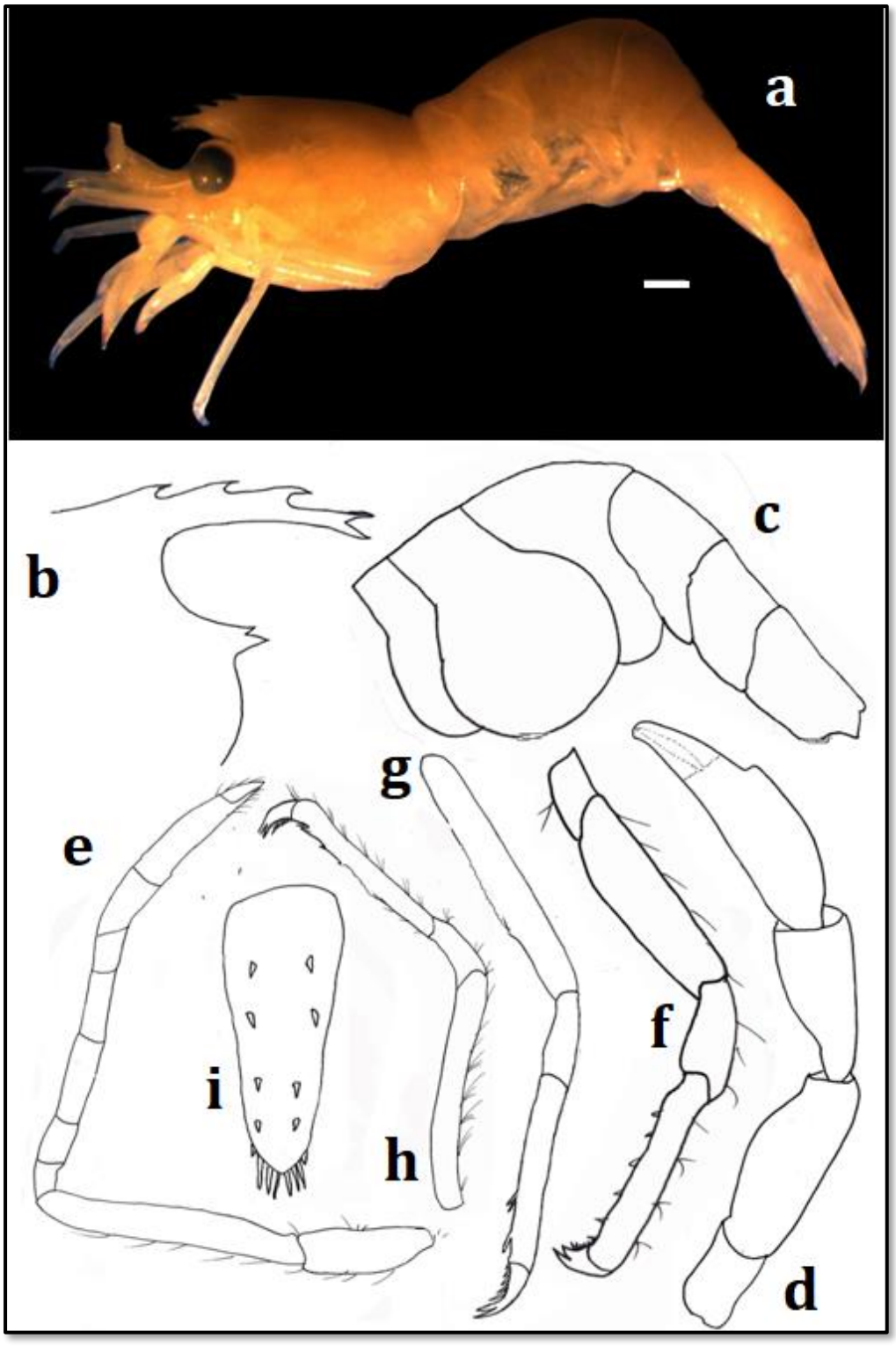

Figure 3.43 *Thor amboinensis* (de Man, 1888): a. Female lateral view; b. Carapace and rostrum; c. Abdomen; d. First pereiopod; e. Second pereiopod f. Third pereiopod; g. Fourth pereiopod; h. Fifth pereiopod. (Scale bar =0.2 mm).

Superfamily **Palaemonoidea Rafinesque, 1815**

Diagnosis-Rostrum well developed; pereiopods without exopods or arthrobranchs; P1 and P2 distinctly chelated; dactylus and pollex not crossing, meeting opposing finger when flexed; P1 not stout; P2 with undivided carpus.

Key to the families of the Superfamily Palaemonoidea occurring in India (in Gujarat*)

1. Mxp3 with antepenultimate segment clearly articulated with and much wider than next proximal segment ……. ***Hymenoceridae***

—Maxillipeds with antepenultimate segment at least partially fused with and not much wider than next proximal segment …….. ***Gnathophyllidae***

2. Maxillipeds with caridean lobe of exopod not acutely produced distally …… ***Palaemonidae****

Family **Palaemonidae Rafinesque, 1815**

Diagnosis- Carapace without complete longitudinal suture; rostrum compressed and usually denated; antennal spine present; hepatic and branchiostegal spines present or absent; eyes well developed; mandible usually with incisor process; first maxilla with mesial coxal lobe not unusually large, mesial basal lobe not reduced; ultimate segment of the Mxp2 laterally attached with penultimate segment, exopod, arthrobranch and pleurobranches present or absent; Mxp3 with antepenultimate segment neither articulated with nor much broader than next proximal segment; chelae of P1 small; P2 large and robust; carpus of the second pereiopod unsegmented; epipods absent from all five pair of pereiopods; Plp2 with appendix masculina in male; telson narrow distally, two or three pairs of spines on posterior margin.

Key to the genera of the family Palaemonidae occurring in India (in Gujarat*)

1.Carapace with branchiostegal spine, sometimes arising posterior to margin …….. **2**

—Carapace without branchiostegal spine…….. **9**

2. Elevated dentate crest at base of rostrum…….. **3**

—No elevated crest at base of rostrum…….. **5 3.** Carapace with branchiostegal suture extending posteriorly from anterior margin at point dorsal to branchiostegal spine…….. ***Exopalaemon* —** Carapace without branchiostegal suture…….. **4 4.** Branchiostegal spine arising from margin of carapace; 2 posterior pairs of pereiopods with dactyl longer than combined length of propodus and carpus; Plp1 of male without appendix interna on endopod…….. ***Nematopalaemon***

—Branchiostegal spine arising posterior to margin of carapace; 2 posterior pairs of pereiopods with dactyl shorter than propodus; in male Plp1 with appendix interna on endopod…….. *Urocaridella*

5. Carapace with branchiostegal suture extending posteriorly from anterior margin at point dorsal to branchiostegal spine…….. **6**

—Carapace without branchiostegal suture…….. **8**

6. Mandible normally with palp…….. ***Palaemon****

—Mandible without palp…….. ***Cuapetes***

7. Dactylus of last three pereiopods simple, hepatic spine usually present …….. ***Ancylocaris****

8. Mandible with palp…….. ***Leander***

Genus ***Ancylocaris*** **Schenkel, 1902**

Periclimenes (Ancylocaris) Schenkel, 1902

Diagnosis- Rostrum well developed, compressed laterally; eyestalks slightly narrow distally; carapace moderately compressed, dorsal region straight or slightly convex, without or with one or more teeth on dorsal side, anterior margin not produced anteroventrally as prominent convex lobe and not deeply concave, without longitudinal branchiostegal suture; antennal and hepatic spines present; orbital margin usually not

interrupted posteriorly; mandible without palp; scaphocerite short, posterior region convex; Mxp3 with exopod; all pair of pereiopods short; P2 moderately stout, similar and subequal; telson with a pair of minute dorsal spines on distal.

44. *Ancylocaris brevicarpalis* Schenkel, 1902 (fig. 3.44)

Ancylocaris brevicarpalis Schenkel, 1902: 563.
Periclimenes (Harpilius) brevicarpalis Holthuis, 1952: 69.
Periclimenes brevicarpalis Johnson, 1962: 59.

Materials Examined- 1 male and 1 female (TL-3.2 cm, CL-1.8 cm; TL-3.6 cm, CL-1.9 cm) (ZL-AR-PR-36), Narara (22°28'05.18" N69°43'28.76" E), Marine National Park, Jamnagar District, 30 October 2016, coll. Barkha Purohit. 2 males (TL-2.7 cm, CL-1.42; TL-2.9 cm; TL-1.64 cm), Kalubhar Island (22°25'28.53" N 69°37'30.21" E), Jamnagar District, 1 November October 2016, coll. Barkha Purohit.

Diagnosis- Body subcylindrical (fig. 3.44a); carapace smooth; rostrum well developed, subequal to antennular peduncle, moderately high, dorsal margin convex, dentate, with first postorbital spine, ventral margin convex, with one to two teeth on distal third of part of rostrum; inferior orbital angle produced, without reflected inner flange, supraorbital and epigastric spines absent, antennal and hepatic spines present (fig. 3.4b); fourth thoracic sternite with broad transverse ridge and subdivided by deep narrow median incision; antennule and antenna as usual for family; upper ramus of antennular flagellum biramous and fused with basal part (fig. 3.44c); scaphocerite slightly broad, with minute distolateral spine falling short of anterior margin of lamina (fig. 3.44d); carpocerite short; mandible without palp; molar and incisor processes normal; Mxp1 fused with endites, exopod well developed, with many terminal setae, caridean lobe normal, epipod feebly bilobed; Mxp2 with normal endopod, exopod as in Mxp1, without caridean lobe, epipod small, simple, without podobranch; Mxp3 with slender endopod, ischium and merus fused or feebly separated from basis, exopod as in Mxp2, coxa with semi-circular lateral plate, single

arthrobranch present (fig. 3.44c); abdomen smooth, third abdominal spomite non-carinated or posteriorly produced, first to fifth posteroventrally rounded; P1 slender, coxa with distomedial setose lobe, chelae fingers's elongate, with lateral cutting edges (fig. 3.44f); P2 moderately stout, similar and subequal, chelae with fingers kept laterally; fingers sub-equal to palm, cutting edges with simple lamina and two low proximal teeth, carpo-propodal articulation simple, in adults carpus much shorter than palm, feebly cup-shaped (fig. 3.44g); ambulatory pereiopods slender, propodus without ventral spines; in male endopod of Plp1 simple, elliptic, with multiple spinules medio-proximally and multiple setae distally; in male Plp2 with appendix masculina, slender and several simple terminal and lateral setae present; uropods normal; telson with two pairs of small dorsal spines on distal third of telson length and three pairs of short posterior marginal spines (fig. 3.44h).

Coloration- The whole body is transparent with large round white spots. The larger one, on the carapace, can have a reticulated pattern. The larger specimens, usual females, have more spots along the abdomen, claws, and legs with blue joints.

Zonation and Habitat- This species is obligatorily associated with *Stichodactyla haddoni*.

Distribution- This species is previously reported from Indo-west Pacific, from the Red Sea and East Africa to Japan, Australia, and the Line Islands (Anker and De Grave, 2016; Ďuriš, and Horká, 2016).

In India, the species is previously reported from East and West coast Gujarat and Tamil Nadu (Unmesh and Prakash, 2011; Radhakrishnan et., 2012).

Commercial/ Ecological Importance- They feed on the tentacles of the host sea anemone. Aquarium observations show that adult females supplied with adequate quantities of food (Bruce and Svoboda, 1983).

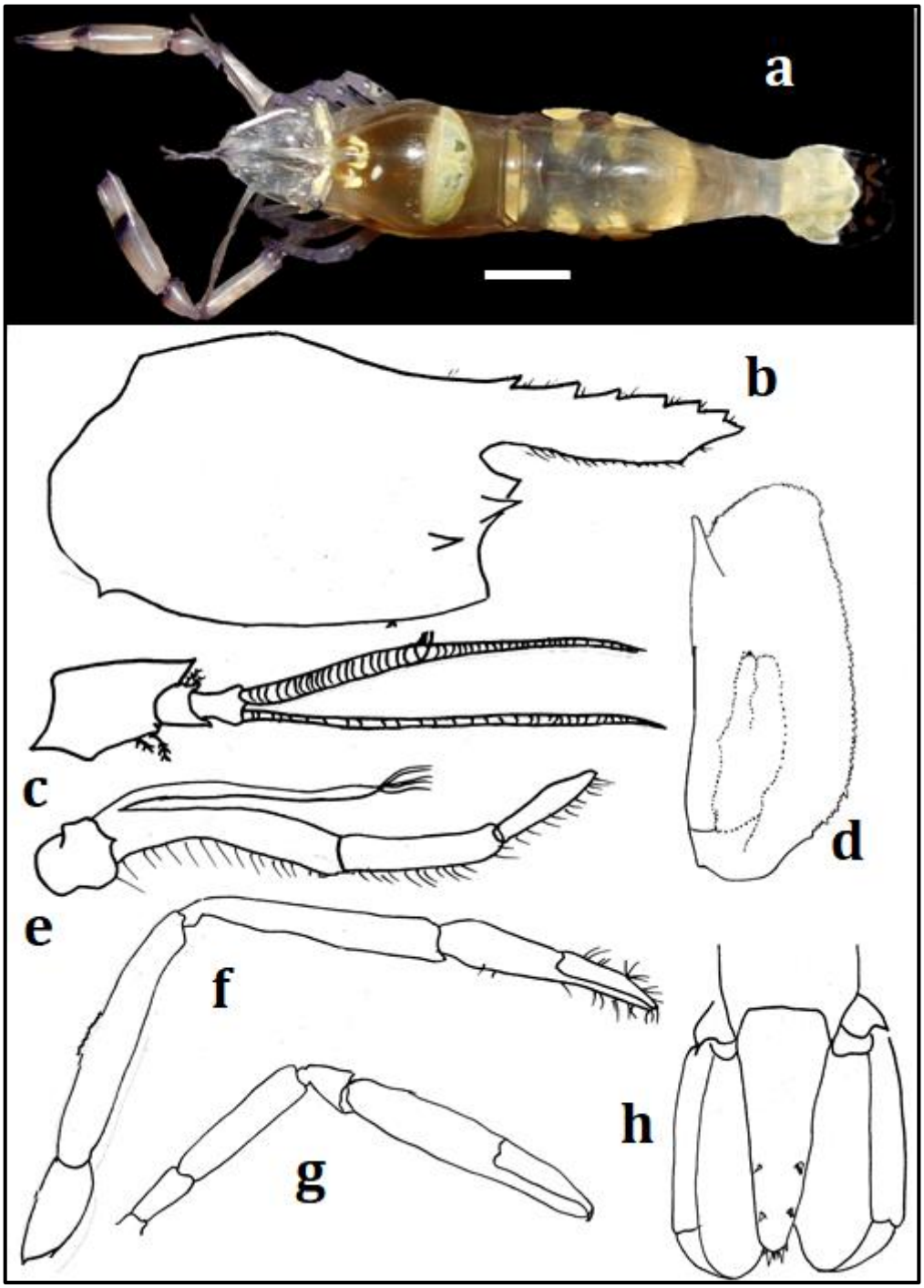

Figure 3.44 *Ancylocaris brevicarpalis* Schenkel, 1902: a. Female dorsal view; b. Carapace; c. Left Antennule; d. Scaphocerite; e. Third maxilliped; f. First right pereiopod; g. Second pereiopod; h. Telson. (Scale bar=0.5 cm).

Genus ***Cuapetes*** **Clark, 1919**

Diagnosis- Carapace smooth, glabrous, rostrum well developed, dorsally and ventrally dentate; epigastric or suborbital spines present or not;

hepatic and antennal spine present; eye well developed, elongate, and subcylindrical, cornea globular, ophthalmic somite without median process; mandible without palp; molar and incisor processes well developed; Mxp1 with simple palp, basal and coxal endites feebly separate, broad, exopod with reduced flagellum, caridean lobe small, broad; epipod large, generally triangular; Mxp2 with normal endopod, dactylar segment narrow, exopod well developed, epipod small, subrectangular, with rudimentary podobranch; Mxp3 normal, ischium and merus not fused to basis, exopod well developed, generally with numerous plumose setae distally, coxa with rounded lateral plate, generally with small or rudimentary arthrobranch; P1 slender, chela with fingers simple; P2 well developed, frequently slender, elongate, generally equal or unequal, similar or dissimilar; fingers of major chela without molar process and fossa; P3 to P5 slender, dactyls simple, without basal process; telson with two pairs of dorsal spines, three pairs of posterior spines.

45. *Cuapetes grandis* (Stimpson, 1860) (fig. 3.45)

Anchistia grandis Stimpson, 1860: 39.
Periclimenes grandis Bruce, 1975: 23; Chace and Bruce, 1993: 112; Müller, 1993: 84; Li, 1997: 238; 2000: 186; 2001: 82.
Periclimenes (Ancylocaris) grandis Kemp, 1922: 210.

Materials Examined- 3 ovi. females (TL-11.35 mm, CL-8.54 mm; TL-13.8 mm, CL-10.69 mm; TL-13.91mm, CL-9.72 mm) (ZL-AR-PR-56). Shivrajpur (22°19'56.95'' N 68°57'00.74'' E), Devbhumi Dwarka District, 14 March 2017, coll. Barkha Purohit. 2 ovi. females (TL-11.09, CL-9.18; TL-11.05; CL-8.17), Veraval (20°54'43.23'' N 70°20'58.69'' E), Gir Somnath District, 7 April 2017, coll. Barkha Purohit.

Diagnosis- Integument smooth, not pitted, on lateral areas of carapace and abdomen (fig. 3.45a); rostrum reaching to slightly beyond level of distal end of antennal scale, palaemonoid, curving slightly anterodorsal, rostral formula 1-2+6-8/2-5, posteriormost tooth not broadly separated from remainder of dorsal rostral series, situated posterior to level of hepatic

spine; carapace with supraorbital spine, hepatic spine not noticeably larger than antennal spine, arising postero-ventral to latter, not extending beyond anterior margin of carapace, orbital angle triangular, not ovate (fig. 3.45b); eye with hemispherical cornea, not produced distally; antennular peduncle with a distolateral spine on basal segment (fig. 3.45c); scaphocerite about 4.0 times as long as broad, lateral margin concave, distolateral tooth distinctly overreaching distal margin of blade (fig. 3.45d); abdomen without compressed dorsal prominence on third somite; fifth somite pointed; sixth somite about 1 ½ times as long as fifth; P1 overreaching scaphocerite by length of fingers, latter not pectinate on opposable margins; fingers of P2 ½ to 4/5 times as long as palm, carpus 3/5- 9/10 times as long as palm, 4.0 to more than 5.0 times as long as distal width, with a distal spine (fig. 3.45f), merus with distinct distal tooth on flexor margin (fig. 3.45e); dactylus of P3 not sub-distally truncate, without denticulate lobe on flexor margin, simple, not bi-unguiculate, flexor margin concave, propodus with few spinules on flexor margin, not segmented; P5 not overreaching antennal scale; uropod overreaching extended telson; maximum postorbital carapace length nearly 4 ½ mm; telson with two pairs of dorsolateral spines anterior to posterior margin, anterior pair arising in anterior ½ of length (fig. 3.45g).

Coloration- Body transparent and yellowish-brown bands are on distal parts of the carpus, propodus, and proximal and distal portion of the second pereiopods' fingers.

Zonation and Habitat- This species has been collected from the coral reef and other reef-associated habitats. A common inhabitant of reef flats and in pools. The species is also collected from the muddy sand, under dead corals, algal crests, and stones.

Distribution- This species is widely distributed across the Indo-Pacific (Anker and De Grave, 2016).

In India, the species is previously reported from the West coast: Goa, Kerala, and Tamil Nadu (Kemp, 1922).

Commercial/ Ecological Importance- These shrimps are found with the association of coral reef and perform some role in the coral-like clearing of the sediments and possibly ward off coral parasites such as some isopods.

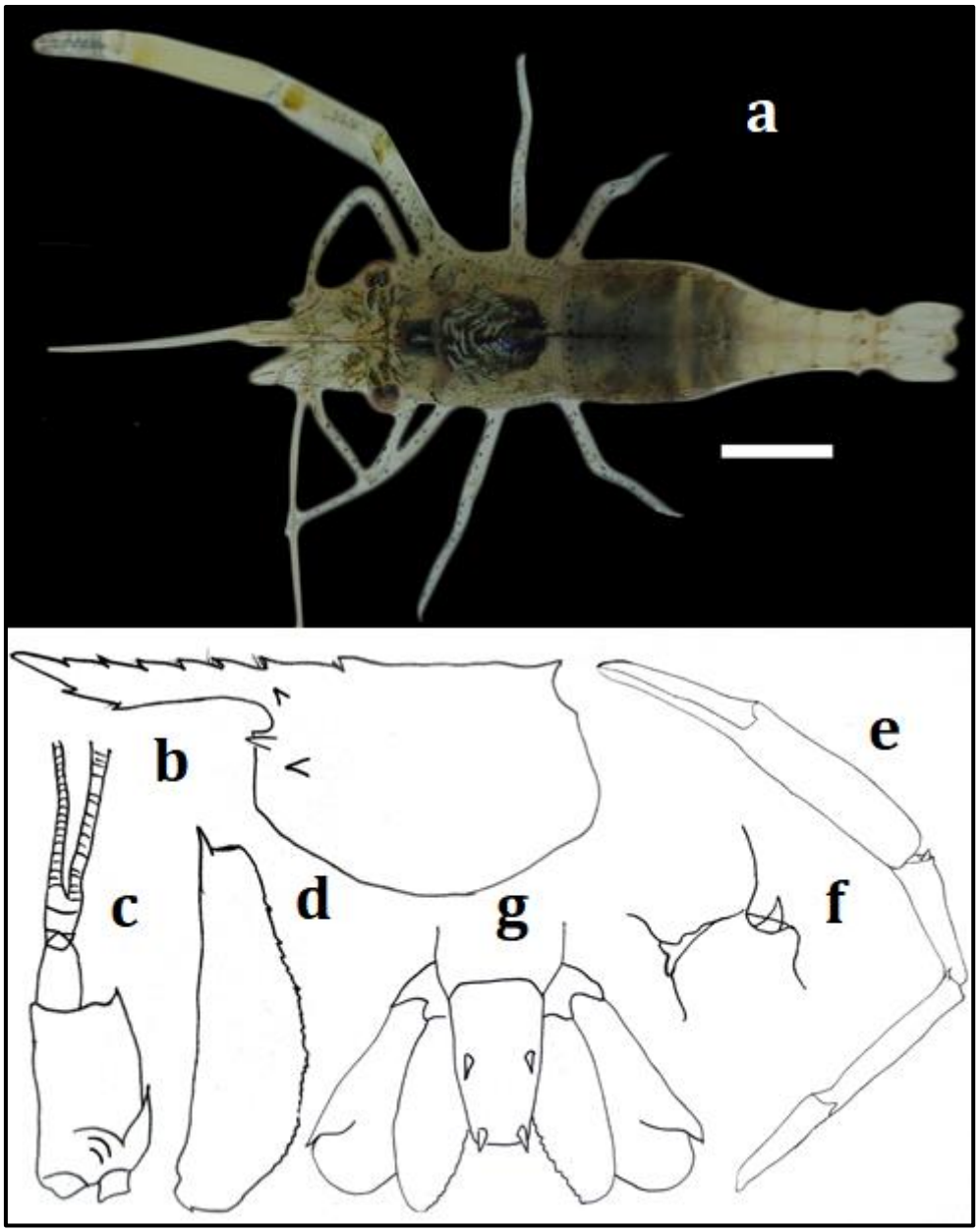

Figure 3.45 *Cuapetes grandis* (Stimpson, 1860)**:** a. Ovi. female dorsal view; b. Carapace and Rostrum; c. antennule; d. Scaphocerite; e. Second pereiopod; f. Second pereiopod's distal spine of carpus. (Scale bar=0.5 cm).

Genus *Nematopalaemon* Holthuis, 1950

Diagnosis- Rostrum with elevated basal crest; carapace with marginal branchiostegal spine, without branchiostegal suture or hepatic spine; stylocerite with dorsal tooth; mandible with palp; pereiopods three to five with dactylus simple, not bi-unguiculate, longer than propodus; first pleopod of male without appendix interna on endopod.

46. *Nematopalaemon tenuipes* (Henderson, 1893) (fig. 3.46)

Leander tenuipes Henderson, 1893: 440, plt. 40, figs. 14-15.
Palaemon luzonensis Blanco, 1939:201, plt.1.
Palaemon tenuipes (Henderson, 1893): 325-458, plts. 36-40
Palaemon (Nematopalaemon) tenuipes Holthuis, 1950: 44, figs. 7a-e.
Nematopalaemon tenuipes Holthuis, 1980: 108; Chace and Bruce, 1993: 39.

Materials Examined- 3 ovi. females (TL-5.4 cm, CL-1.8 cm; TL-3.1 cm, CL-0.8 cm; TL-3.5 cm, CL-0.85 mm) (ZL-AR-PR-5), Umargam (20°11’49.02” N 72°45’00.08” E), Valsad District, 7 November 2017, coll. Barkha Purohit. 2 females (TL- 5.2 cm, CL- 1.8 cm; TL-4.2 cm, CL-1.3 cm; TL-3.2 mm, CL-0.75 cm), Lakhpat (23°49’29.19” N 68°46’09.77” E), Kachchh District, 27 March 2015, coll. Barkha Purohit. 1 female and 1 male (TL- 6.2 cm, CL- 2.01 cm; TL-4.5 cm, CL-1.35 cm), Okhamadhi (22°04’54.74” N 69°06’07.92” E), Jamnagar District, 26 March 2016, coll. Barkha Purohit.

3 males and 2 females (TL- 5.1 cm, CL-1.7 cm; TL-4.2 cm, CL-1.25 cm; TL-3.2 cm, CL-0.6 cm), Veraval (20°54'43.35'' N 70°20'58.44'' E), Gir Somnath District, 21 March 2016, coll. Barkha Purohit.

Diagnosis- Rostrum elongated, overreaching antennal scale, basal crest elevated; tooth present on both dorsal and ventral side, rostra formula 1-3+5-6/2-6; branchiostegal groove absent, antennal and branchiostegal spine present on carapace (figs 3.46 a & b); abdomen little compressed laterally; sixth abdominal segment not more than 2/3 as long as postorbital carapace length (fig. 3.46a); P2 longer than P1; finger of chela more than twice of length of carpus; carpus not subdivide (figs. 3.46c& d); dactylus of

P3 to P5 elongated, thread-like; dactylus P3 longer than propodus and thread-like.

Coloration-Body semi-transparent and red color chromatophores are scattered on the whole body. The distal part of the rostrum and telson are dark reddish-brown. Reddish-brown spots are presently based on the uropods. Eggs are deep yellow.

Zonation and Habitat- This species has been collected from trawl catches at a depth of 15-20 m.

Distribution- This species is previously reported from South Africa, India, Burma, Thailand, the Philippines, Taiwan, New Zealand, and Pakistan (Chace and Bruce, 1993).

In India, the species is previously reported from both East and West coast: Gujarat, Maharashtra, Andhra Pradesh, Tamil Nadu, Odisha, and West Bengal (Radhakrishnan et al., 2012).

Commercial/ Ecological Importance- These species have fisheries value.

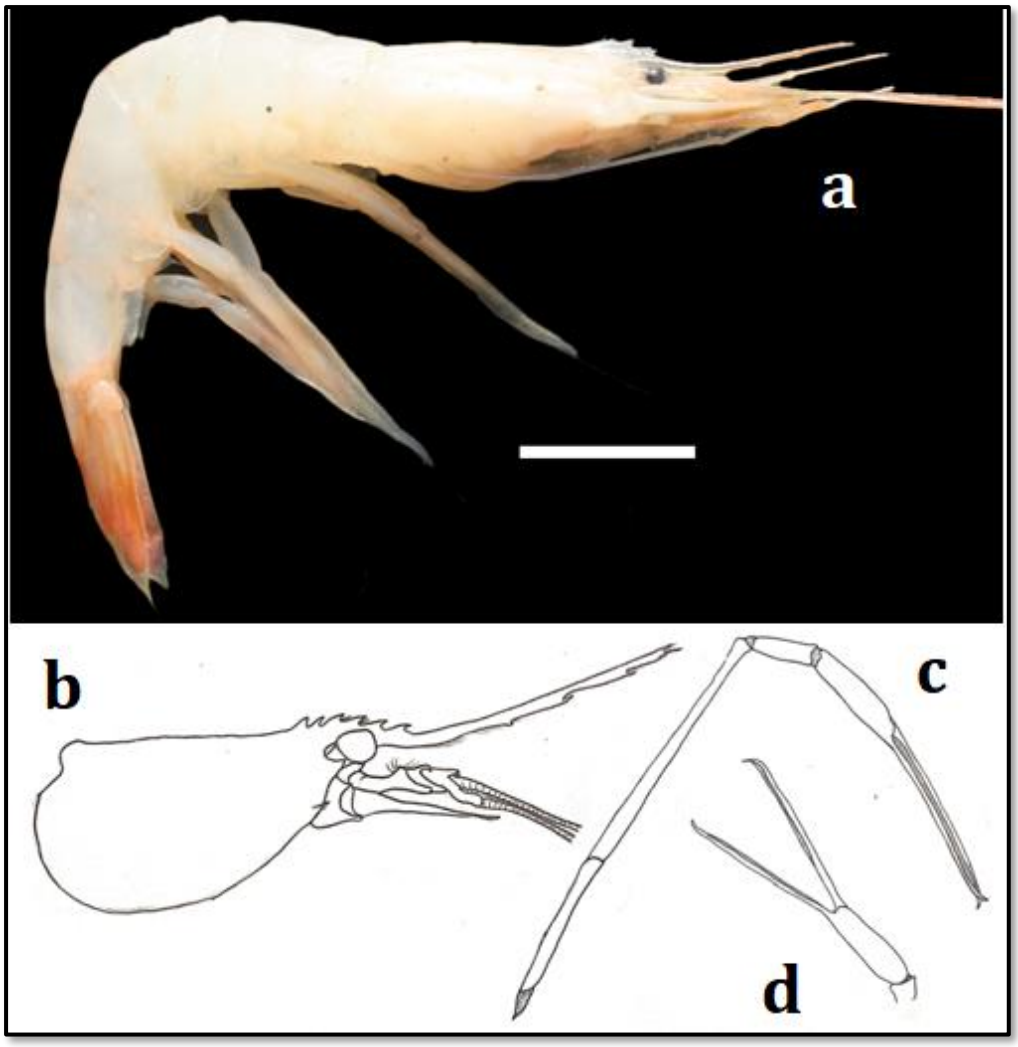

Figure 3.46 *Nematopalaemon tenuipes* (Henderson, 1893): a. Female lateral view; b. Carapace and Rostrum; c. Second pereiopod; d. chela of the second pereiopod. (Scale bar=0.5 cm).

Genus ***Palaemon*** **Weber, 1795**

Alaocaris Holthuis, 1949:87-95.
Allocaris Sollaud, 1911: 50-56
Coutierella Sollaud, 1914: 314-324
Exopalaemon Holthuis, 1950: 1-268.
Palaeander Holthuis, 1950: 1-268.
Palaemon Fabricius, 1798: 1-572.

Diagnosis- Carapace smooth; rostrum well developed; toothed dorsally and ventrally, without an elevated basal crest; upper margin bearing a

single row of setae between dorsal teeth; bearing distinct branchiostegal spine and groove; branchiostegal spine usually situated on carapace margin; groove usually running straight back from carapace margin in a shallow arc shape but may rise upwards and over spine before continuing posteriorly; antennal spine generally strong, on anterior margin of carapace some distance below rounded lower orbital angle; mandibular palp usually of two or three segments, sometimes absent; eyes distinctly pigmented; cornea well developed; anterior margin of antennular peduncle rounded; anterolateral spine small; pleura of fifth abdominal somite usually ending in a small sharp point; propodus of P5 with several transverse rows of setae on distal part of posterior margin; telson with two slender median setae on posterior margin.

47. *Palaemon pacificus* (Stimpson, 1860) (fig. 3.47)

Leander pacificus Stimpson, 1860: 40; Kemp, 1925: 307.
Leander okiensis Kamita, 1950: 216, fig. 2.
Palaemon (Palaemon) pacificus Holthuis, 1950: 87, figs. 19a-g; Chan and Yu, 1985: 122, figs. 3a-f.
Palaemon pacificus Chace and Bruce, 1993: 41; Li et al., 2007: 155, figs. 60a-g.
Palaemon serrifer Jeng, 1998: 37, unnumbered fig.

Material Examined- 5 males and 4 females (TL-18.30 mm, CL-6.62 mm; TL-19.55 mm, CL-7.65 mm; TL-18.10 mm, CL-6.92 mm; TL- 23.70 mm, CL-8.84 mm; TL-25.06 mm, CL-9.83 mm; TL-25 mm, CL-9.15 mm; TL-24.60 mm, CL-9.58 mm; TL-24.09 mm, CL-9.20 mm; TL-23.58 mm, CL-9.18 mm) (ZL-AR-PR-52), Sutrapada (20°49’55.5” N 70°29’16.54” E), Gir Somnath District, 19 March 2016, coll. Barkha Purohit. 4 males and 2 females (TL-16.24 mm, CL-5.64 mm; TL-35.30 mm, CL-15.17 mm; TL-27.54 mm, CL-10.33 mm; TL-29.72 mm, CL-11.97 mm; TL-22.25 mm, CL-8.86 mm; TL-18.98 mm, CL-7.11 mm), Veraval (20°54'43.35'' N 70°20'58.44'' E), Gir Somnath District, 21 March 2016, coll. Barkha Purohit. 4 females (TL-21.92 mm, CL-8.56 mm; TL-23.41mm, CL-9.37 mm; TL-20.40 mm, CL-7.95 mm;

TL-21.43 mm, CL-8.53 mm), Miyani (21°47'05.62" N 69°24'51.53" E), Porbandar District, 22 February 2016, coll. Barkha Purohit.

Diagnosis- Rostrum ascendant in distal half, tapering gradually; rostral formula 1-3+6-9/3-5 (figs 3.47a & b); last segment of antennule peduncle narrow; stylocerite short, distally acute, reaching half of segment length; disto-lateral angle strongly produced with well-developed disto-lateral spine, up to or beyond of middle of second segment; second and third subequal in length, together about as long as 0.6 times of proximal segment; second with lateral lobe; upper flagellum biramous and rami slender, fused in nine proximal segments, shorter ramus with twenty-five free segments; fused portion 0.4 times as long as free portion (fig. 3.47d); basicerite with strong lateral tooth; scaphocerite extending slightly beyond antennular peduncle, lamella narrow, about 3.1 times longer than broad, anterior border rounded, with strong distal tooth (fig. 3.47c); Mxp3 with endopod slender overreaching antennal peduncle (fig. 3.47e); P1 extending beyond anterior border of scaphocerite by length of fingers carpus 1.6 times as long as chela; basis short; coxa robust (fig. 3.47f); P2 well developed with robust; chela 1.3-1.4 times length of carpus; merus not reaching end of antennal peduncle; palm smooth, subcylindrical; fingers 0.8 times as long as palm; chela 1.3 times as long as carpus; carpus 4.3 times longer than distal part (figs. 3.47g & h); P3 and P4 slightly overreaching scaphocerite (figs. 3.47i & j) ; P3 with merus 7.2 times longer than its terminal width; 1.8 times longer than carpus, 1.1 times as long as propodus; six movable spinules present on ventral margin propodus (fig. 3.47i); P5 not overreaching scaphocerite; almost 6.5 times longer than distal width, carpus 1.55 times longer than carpus and slightly shorter than propodus; propodus with five movable spinules on ventral margin (fig. 3.45k); telson 3.4 times longer than wider anteriorly; sides margins straight; two pairs of well-developed dorsal spines present on terminal half region; lateral proximal spines slightly smaller than dorsal spines; intermediate spines large.

Coloration- Color pattern agrees well with that given by Kubo (1942). Light reddish rather narrow (like the young of *P. Pacificus*), longitudinal bands on the carapace, and transverse bands on the abdomen and distal ends of joints of appendages.

Zonation and Habitat- The species is found in sandy tide pools. The bottom of the tide pool is sandy. They are situated in a rocky shore area without rounded boulders.

Distribution-This species is distributed along the Indo-Pacific, Suez Canal, the Red Sea, Eastern and Southern Africa, Southern China, India, Hong Kong, Japan, Indonesia, New Caledonia, Hawaii, and Taiwan (Chan and Yu, 1985; Li et al., 2004).

In India, the species is previously reported from both East and West coast: Goa (Thomas, 1986) and Tamil Nadu (Gravely, 1930).

Commercial/ Ecological Importance- This can be used as an ornamental species.

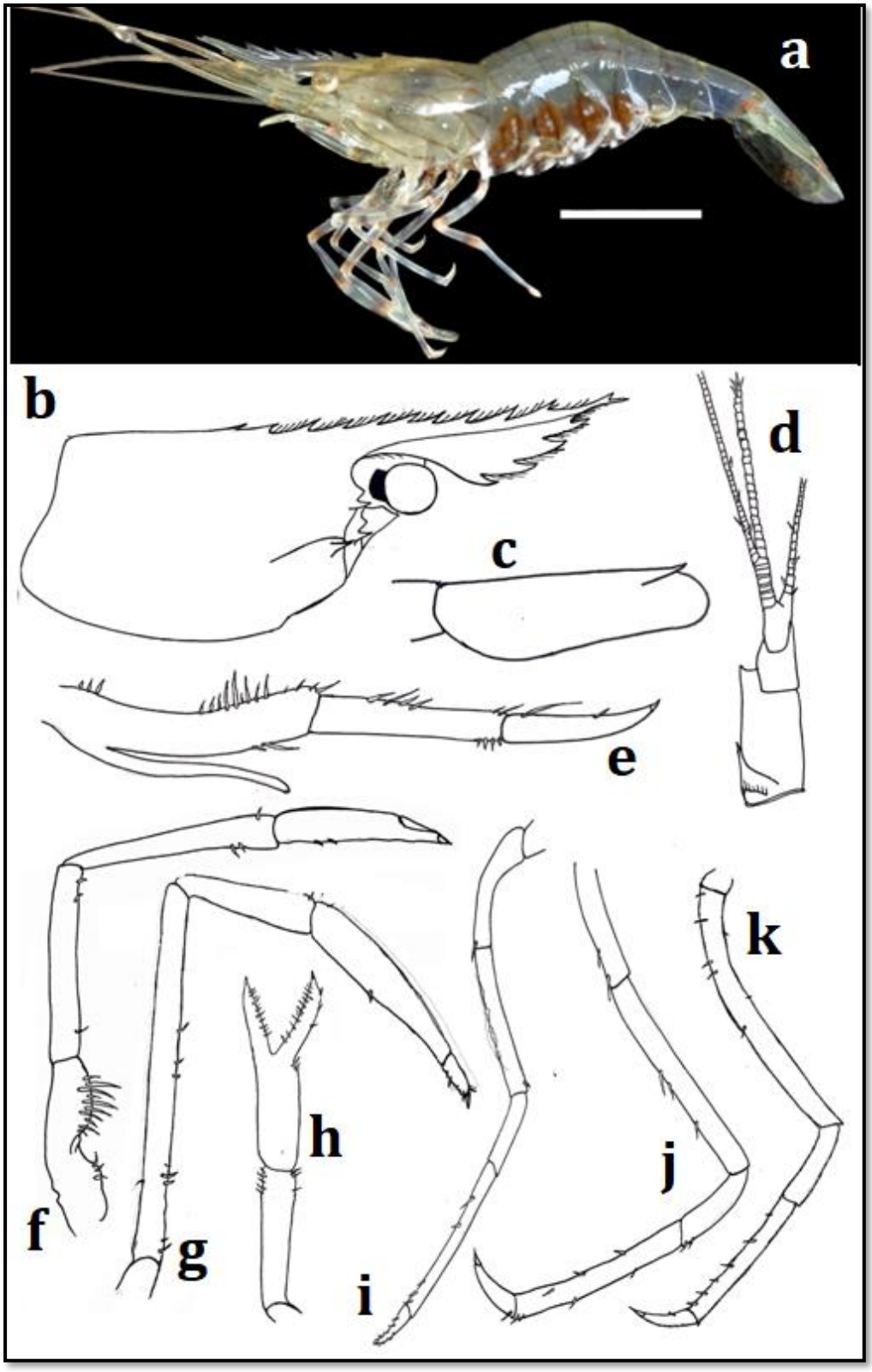

Figure 3.47 *Palaemon pacificus* (Stimpson, 1860): a. Ovi. female lateral view; b. Carapace of a female; c. Scaphocerite; d. Antennule; e. Third maxilliped; f First pereiopod, g. & h. Second pereiopod; i. Third pereiopod; j. Fourth pereiopod; k. Fifth pereiopod. (Scale bar=1 cm).

48. *Palaemon serrifer* (Stimpson, 1860) (fig. 3.48)

Leander serrifer Stimpson, 1860: 41.

Leander fagei Yu, 1930:

Palaemon serrifer Holthuis 1950: 83; Johnson, 1962: 55.

Palaemon serrifer Johnson, 1979: 31; Ashelby et al., 2012: 296.

Materials Examined- 1 male and 1 ovi. female (TL-16.24 mm, CL-5.64 mm; TL-35.50 mm, CL-15.17 mm) (ZL-AR-PR-31), Gopnath (21°12'37.84" N 72°06'31.53" E), Bhavnagar District, 2 May 2014, coll. Barkha Purohit and Gunjan Soni. 1 male (TL-27.54 mm; CL-9.83 mm), Jhanjhmer (21°10'42.08" N 72°03'53.27" E), Bhavnagar District, 10 October 2016, coll. Barkha Purohit. 2 females (TL-25.0 mm, CL-9.15 mm; TL-24.60 mm, CL-9.58 mm), Jafrabad (20°51'26.87" N 71°22'59.16" E), Amreli District, 12 November 2016, coll. Barkha Purohit. 1 ovi. female (TL-23.58 mm, TL-9.18 mm), Mahuva (21°05'34.54" N 71°46'14.59" E), Bhavnagar District, 11 November 2016, coll. Barkha Purohit. 2 males and 2 females (TL-18.30 mm, CL-6.62 mm; TL-19.55 mm, CL-7.65 mm; TL- 18.98mm, CL-7.11 mm; TL-22.25 mm, CL-8.89 mm), Kuda (21°37'36.14" N 72°18'21.70" E), Bhavnagar District, 20 December 2016, coll. Barkha Purohit.

Diagnosis- Carapace smooth and glabrous (fig. 3.48a); rostrum shorter than carapace, well developed; somewhat distally upturned in females; horizontally straight in males, armed with 8-13 on dorsal region, first two teeth posterior to the level of the postorbital margin; ventral carina well developed and armed with 3-5 teeth, deeper than dorsal; epigastric spine well defined and articulated; anterolateral angle not produced and blunt; antennae with stout basicerite, with large sharp ventrolateral tooth; carpocerite short and stout (figs. 3.48b & c); scaphocerite about 2.7-3.0 times as long as broad; outer margin almost straight. (fig. 3.48d); upper antennular flagella with fused region half-length shorter free ramus (fig. 3.48e); mandible with three segmented palp; endopod of Mxp3 slender; penultimate segment 0.6 times longer than antennule segment, uniform and dense setae present laterally; in medial spine form setae present; distal

portion tapering with small spine; a transverse rows of short spine present on medial part of penultimate segment and setose on lateral portion (fig. 3.48f); abdominal segment smooth; sixth segment almost 1.5 times longer than fifth; 1.5 times longer than deeper, compressed; postro-lateral and postro-ventral angles produced acutely (fig. 3.48a); all pereiopods reaching up to the apex of scaphocerite except second (fig. 3.48a); P1 subequal and slender; finger of P2 shorter than palm (fig. 3.48g); telson about 1.3 times longer than sixth abdominal segment, ventrally strong and concave; lateral margin convex; two pairs of small spine present on dorsal region; lateral spine sub-equal to dorsal spine; intermedian spine densely setose and well developed; lateral border of uropods straight and sub-marginal row of short setae present on ventro-laterally (figs. 3.48h & i).

Coloration- The entire body is transparent and covered with many unequal and un-patterned red-brown stripes. Black-brown spots are present on all abdomen segments. The fingers of the P2 are light blue.

Zonation and Habitat- This species has been collected from the small tide pool on a muddy shore.

Distribution- This species is distributed along the Indo-west Pacific, India, Myanmar, Singapore, Indonesia, Australia, China, Taiwan, and Eastern Russia (Anker and De Grave, 2016).

In India, the species is previously reported from the West coast: Bombay (Kemp, 1925) and Gujarat (present study).

Commercial/Ecological importance- This can be used as an ornamental species.

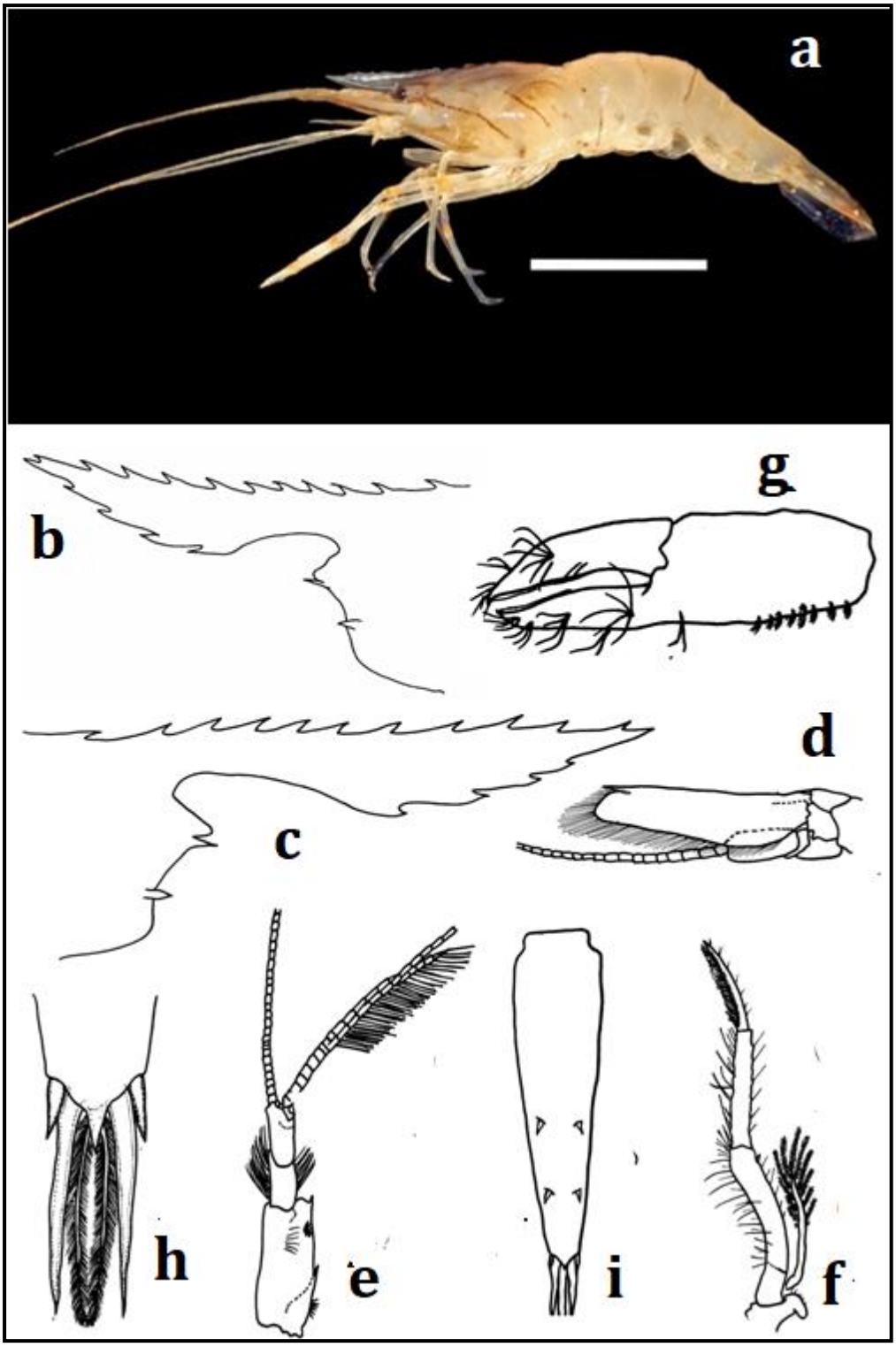

Figure 3.48 *Palaemon serrifer* (Stimpson, 1860): a. Male lateral view; b. Carapace of a female; c. Carapace of a male; d. Scaphocerite; e. Antennule; f. Third maxilliped; g. Chela of second pereiopod; h. Tip of telson; i. Telson. (Scale bar=1 cm).

49. *Palaemon styliferus* H. Milne Edwards, 1840 (fig. 3.49)

Leander styliferus (H. Milne Edwards, 1840)

Exopalaemon styliferus Chace and Bruce, 1993: 543

Palemon styliferus H. Milne Edwards, 1840: 638, plts. 1-42

Materials Examined- 1 female (TL-7.4 cm, CL-3 cm) (ZL-AR-PR-19), Onjal (20°48'44.78" N 72°49'31.71" E), Navsari District, 3 November 2017, coll. Barkha Purohit. 2 females (TL-13.2 cm, CL-5.1cm; TL-11cm, CL- 4 cm), Mangrol (21°07'22.3" N 70°07'19.5" E), Junagadh District, 26 October 2017. 2 females (TL-12.2 cm, CL- 5.1 cm; TL- 11 cm, CL- 4.8 cm), Local fish market, Bhavnagar (21°46'39.18" N 72°09'13.53" E), Bhavnagar District, 10 September 2017, coll. Barkha Purohit. 1 male (TL-12.5 cm, CL-5 cm), Jamnagar (22°28'04.80" N 70°04'52.89" E), Jamnagar District, 29 November 2016, coll. Barkha Purohit. 1 male (TL-11.04 cm, CL-3.8 cm), Hansot (21°34'14.74" N 72°48'15.66" E), Bharuch District, 17 November 2017, coll. Barkha Purohit.

Diagnosis- Rostrum long and slender, with 5-7 teeth on basal crest; most of distal region of dorsal region toothless, 1 or 2 subdistal teeth; ventral region with 6-10 teeth; branchiostegal spine and branchiostegal groove present; antennule peduncle with distolateral spine on basal segment (fig. 3.49a & b); abdominal segments dorsally rounded, without crest; last four abdominal somites not sharply carinate in dorsal midline; pleura of fifth abdominal segment rounded (fig. 3.49a); Chela of P1 slender, almost reaching up to end of antennal scale; ischium shorter than merus; merus shorten than carpus or sometimes equal; fingers slightly longer than palm; P2slender, longer and stronger than P1; ischium longer than merus; carpus shorter than chela; fingers pincer longer than palm, slightly swollen, curved; palm inflated (figs. 3.49 c & d); last three pair of pereiopod (P3 to P5) slender, non-chelate; dactylus of last three pereiopod simple (figs. 3.49e, f & g); dactyls of P5 about 1/3 as long as propodus (fig. 3.49g).

Coloration- The body is whitish translucent, with the distal part of the rostrum dark reddish-brown and some darker spots present on the tips of

uropods and telson. In ovi. females, large dark spots are present on the first four abdominal pleura. Eggs are yellowish.

Zonation and Habitat- This species has been collected from trawl catches, depth 37m.

Distribution- This species is distributed Northern coast of Borneo and Indonesia westward via Thailand and India to Pakistan, Southwestern Iraq, and Kuwait to the Persian Gulf (Zare et al., 2010).

In India, the species is previously reported from both East and West coast of India: Gujarat, Maharashtra, Tamil Nadu, Odisha, and West Bengal (Radhakrishana et al., 2011).

Commercial/Ecological importance- This species is commercially significant.

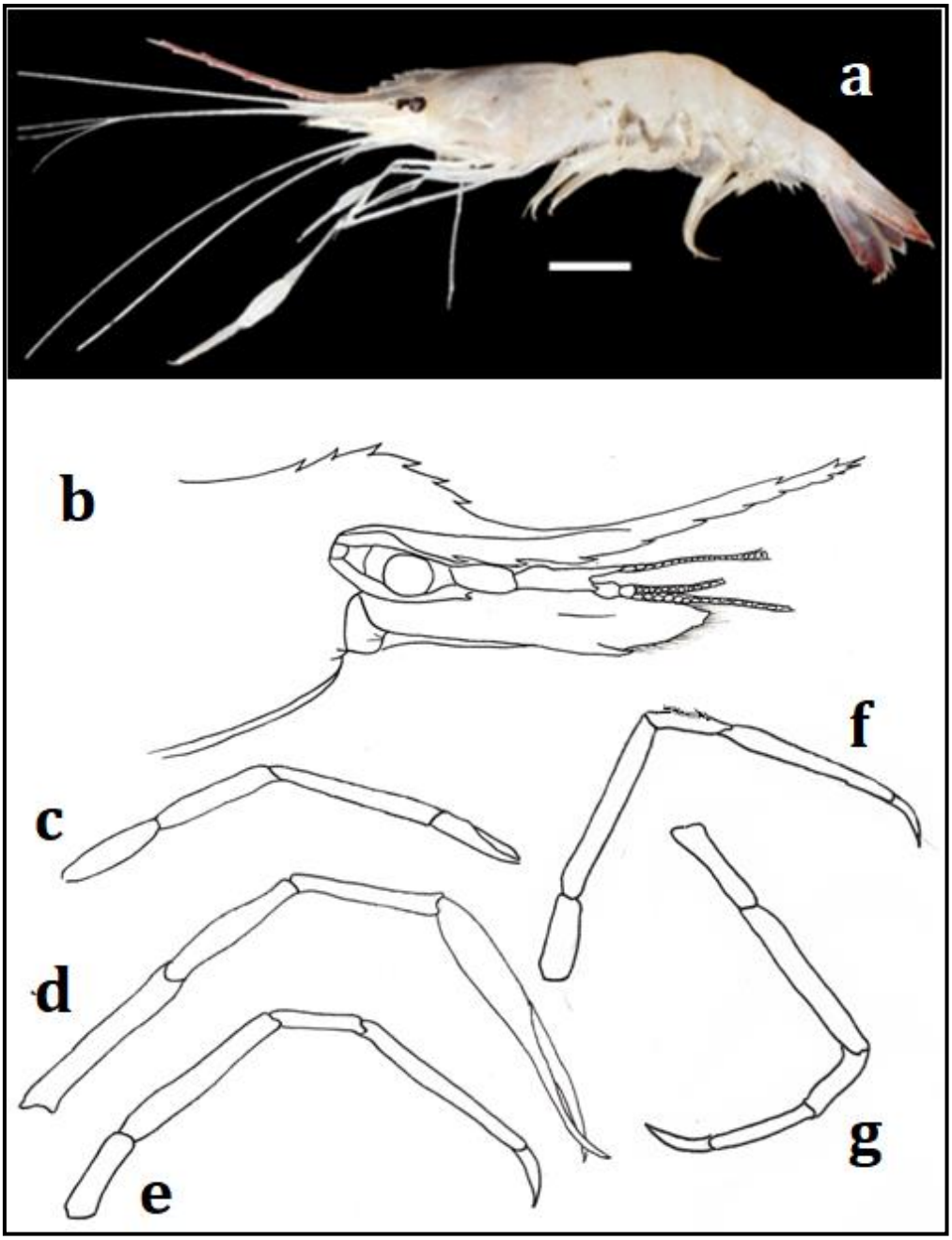

Figure 3.49 *Palaemon styliferus* H. Milne Edwards, 1840: a. Male lateral view; b. First pereiopod; c. Second pereiopod; d. Third pereiopod; e. Fourth pereiopod; d. Fifth pereiopod. (Scale bar= 0.5 cm).

Superfamily **Pandaloidea Haworth, 1825**

Diagnosis- Rostrum well developed generally with one or more teeth; mandible usually with incisor and molar process and palp; P1 with microscopic chela or absent; carpus of P2 multisegmented or undivided.

Family **Pandalidae Haworth, 1825**

Amphionididae Holthuis, 1955: 139.

Thalassocarididae Spence Bate, 1888: 1- 9, 1-942, plts. 1-150

Diagnosis- Rostrum changing, laterally compressed and well developed; maxilliped with exopod far removed from endite; P1 and P2 not similar; without pectinate fingers; P1 simple and microscopic; P2 with conventional chela; carpus subdivide into two or more segments; in male Plp1 with endopod laminar, usually large or elaborately convoluted.

Key to the genera of the family Pandalidae occurring in India (in Gujarat*)

1. Carpus of P2 consisting of more than three segments …….. **2**

2. Supra-orbital spine present. Mandible with three jointed palps; rostrum long and very slender…….. *Chlorotocella*

— Supra-orbital spine absent; mandible without palp; rostrum short and deep…….. ***Chlorocurtis***

3. Carpus of P2 subdivided into more than three segments; maximum total length usually more than 10 cm except …….. ***Heterocarpoides***

4. Eyes well developed; dark cornea much wider than the eyestalk …… **5**

—Eyes poorly advanced, dark cornea narrower than the eyestalk …….. ……..

Dorodotes

5. Second pair of pereiopods unequal, with at least seven segments in the carpus; maximum total length more than 10 cm ..... ***Heterocarpus***

—Second pair of pereiopods equal, with only six segments in the carpus; maximum full size 5 cm ..... *Heterocarpoides*

6. Epipods present on at least first two pairs of pereiopods ..... ***Plesionika***

—Epipods absent from all pereiopods …….. ***Parapandalus***

Genus ***Procletes*** **Spence Bate, 1888**

Heterocarpoides de Man, 1917: 279-284

Heterocarpus (Heterocapoides) De Man, 1917:

Diagnosis- Rostrum long, armed with teeth on dorsal and ventral margins; carapace without supraorbital spine, dorsally carinate nearly to posterior margin; abdominal somites with dorsomedial spines; eyes cornea broader than eyestalk; Mxp3 with exopod, epipods present on four pair of anterior pereiopods; P2 subequal and similar, carpus subdivided into five to six segments.

50. *Procletes levicarina* (Spence Bate, 1888) (fig. 3.50)

Dorodotes levicarina Bate, 1888: 680.
Heterocarpus (Heterocarpoides) levicarina De Man, 1920: 110, 178, plt. 15, figs. 44-44f.
Heterocarpoides levicarina Calman, 1939: 207; Liu, 1963: 231; Chace, 1985: 16, figs. 11, 12.
Heterocarpus (Heterocapoides [sic] glabrus Zarenkov, 1971: 193, fig. 4.
Heterocarpus (Procletes) levicarina Menon, 1972: 382-390.
Procletes levicarina Holthuis, 1993: 278, fig. 277; Miyake, 1998: 187; Li & Komai, 2003: 271.

Materials examined- 3 ovi. females (TL- 43.60 mm, CL-22.09 mm; TL-53.36 mm, CL-22.09 mm; TL-55.33 mm, CL-22.75 mm) (ZL-AR-PR-23), Subhashnagar Bandar (21°38'39" N, 69°35'28" E), Porbandar District, 26 March 2016, coll. Barkha Purohit.

Diagnosis- Rostrum longer than carapace length, overreaching antennal scale, somewhat upward distally; dorsal margin armed with eleven to fourteen teeth, including four or five teeth on carapace posterior to level of orbital margin, posterior most tooth with distinct basal suture; ventral margin armed with five to seven teeth; carapace dorsally carinate nearly to posterior margin; posterior end of dorso-median carina with small papilla; eye with papilla on ventro-median surface of eyestalk proximal to cornea; strong antennal and branchiostegal spines present; lateral carina not sharp but distinct; antennular peduncle falling short of half of antennal scale; stylocerite acute, overreaching basal segment (fig. 3.50a & b); antennal scale with distolateral tooth overreaching distal margin of blade; Mxp3

with epipod and exopod; abdomen with dorso-median carina on all somites; third to fifth somites each with strong poster median tooth; pleura of fourth to sixth somites with small tooth poster ventrally; tergum of fourth and fifth somites with numerous tegumental scales (fig. 3.50c); P1 to P4 with epipods; pair of P2 subequal and similar, carpus composed of six or seven segments; dactylus of P3 about 2/5 as long as propodus; carpus unarmed or armed with one or two small spines, merus with eleven to sixteen small spines, ischium with one small spine; P4 more slender than P3, carpus with one small spine, merus with nine to eleven small spines, ischium with one or two small spines; P5 more slender than fourth pair, carpus with one small spine, merus with seven or eight small spines, ischium without spine; appendix interna on Plp2 broad distally; appendix masculina armed with more than twenty long spines on anteromesial and distal margins; telson armed with four pairs of small dorso-lateral spines, posterior pair superimposed above bases of lateral pair of posterior spines, posterior margin acutely triangular, with pair of long, stout, lateral spines and median pair of contiguous spines concealed beneath triangular margin.

Coloration- Body milky brown or light brown in base color scattered with small red or pink spots; rostrum somewhat transparent; thoracic appendages red.

Zonation and Habitat- This species has collected from trawl catches, depth 25 m.

Distribution-This species is previously reported from the Red Sea to Indonesia, the South China Sea, Philippines, Japan, and Korea (Li and Komai, 2003; Kim et al., 2011).

In India, the species is previously reported from both East and West coast: Andhra Pradesh (Lalitha, 1980) and Gujarat (present study).

Commercial/Ecological Importance- This species has fisheries potential.

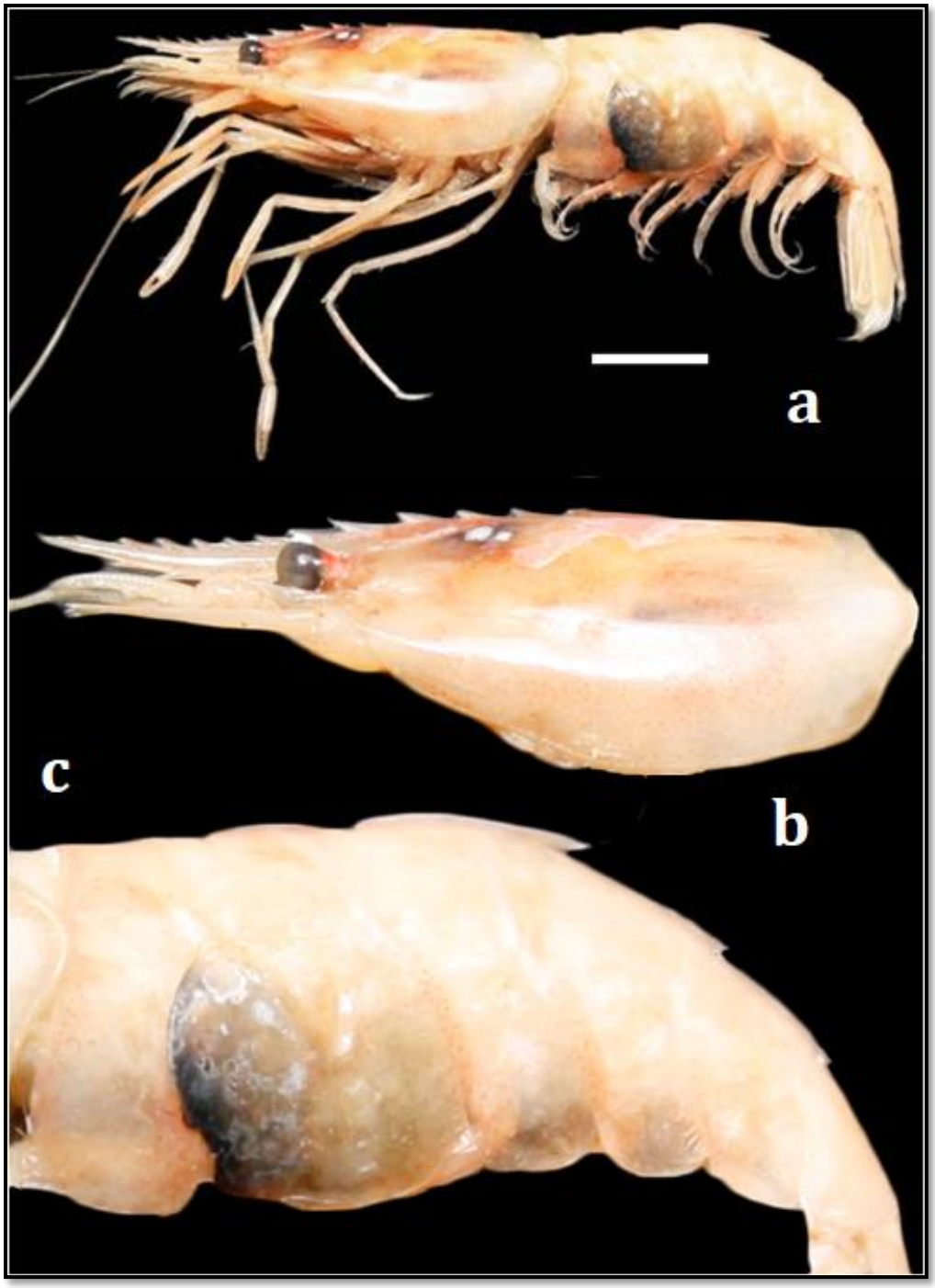

Figure 3.50 *Procletes levicarina* (Spence Bate, 1888): a. Ovi. female lateral view b. Carapace; c. Abdomen. (Scale bar = 0.5 cm).

Infraorder **Gebiidea de Saint Laurent, 1979**

Thalassinida Sakai, 2011: 1-616.

Diagnosis- first pereiopods chelated or subchelated; P2 subchelated or simple (both pair of pereiopods are never chelated).

Key to the family of the Infraorder Gebiidea de Saint Laurent, 1979, occurring in India (In Gujarat*)

1. P1subequal; P2 Subchelate; rostrum narrow and triangular; eyestalk cylindrical; linea thalassinica straight, runs the entire length of carapace; …….. **Thalassinidae**

— P1 equal chelate; P2 simple; rostrum usually broad and setose; eyestalks cylindrical; linea thalassinica on anterior region but a variable posterior region of carapace ……**Upogebiidae***

Family **Upogebiidae Borradaile, 1903**

Gebiadae Haworth, 1825: 183-184; Davie, 2002: 480.
Upogebiinae Borradaile, 1903: 542.
Kuwaitupogebiidae Sakai, Türkay & Al Aidaroos, 2015: 1221-1234.
Neogebiculinae Sakai, 2006: 1-185.

Diagnosis- Rostrum well developed, spinous; lateral ridges of gastric region present or absent; hepatic spine present or absent; ocular peduncles cylindrical, cornea terminal; antennal scale reduced; Mxp3 with exopod and endopod pediform; P1 chelate, subchelate or simple; P2 to P5 simple; Plp1 present in females, absent in males; Plp2 to Plp5 biramous, without appendix interna; uropods broad or narrow.

Key to the Genera of the Family Upogebiidae Borradaile, 1903 occurring in India (in Gujarat *)

1. Infrarostral spines present…….. *Gebiaeanth*

— Infrarostral spines absent…….. ***Upogebia****

Genus ***Upogebia*** **Leach, 1814**

Upogebia Leach, 1814: 400; Laurent & LeLoeuff 1979: 36; Sakai 2006a: 38–40.
Kuwaitupogebia Sakai, Türkay & Al Aidaroos, 2015: 1223–1224.

Diagnosis- Carapace with rostrum well developed, spinous; without infrarostral spine; lateral ridges of gastric region projecting forward or not; anterolateral margin of armed or not; hepatic spine present or not; P1 chelated or subhelated; P2 to P5 simple; telson straight or concave medially on posterior margin; uropodal exopods larger than endopods.

51. *Upogebia carinicauda* (Stimpson, 1860) (fig. 3.51)

*Gebia carini*cauda Stimpson, 1860: 23; de Man, 1888: 256; Miers, 1884: 280.
Upogebia (Upogebia) carinicauda Stimpson, 1860: 22-47.
Upogebia (Upogebia) carinicauda var. gracilipes De Man, 1927: 341-345.
Upogebia foresti Ngoc-Ho, 1989: 865-878.
Upogebia rupicola Komai, 2005: 259-268.

Materials examined- 1 male (TL-2.2 cm, CL-0.8 cm) (ZL-AR-PR-37), Pirotan Island (23˚36'14" N 69˚57'30" E), Marine National Park, Jamnagar District, 22 October 2015, coll. Barkha Purohit.

Diagnosis- Carapace smooth, pubescent and depressed; rostrum triangular, narrow with rounded frontal margin; with six sub-terminal spines; lateral longitudinal ridges present on carapace with ten to thirteen denticles; anterolateral margin of carapace with a single spine; linea thalassinica discontinuous, extends backward to posterior margin of carapace; antennular peduncle reaching up to middle part of distal segment (figs. 3.51a, b & c); posterior margin of sixth abdominal segment smooth (fig. 3.51a); P1 sub-chelated; coxa with a small distal spine on mesial surface; ischium unarmed on ventral margin, with acute spine; merus with two large subdistal spines; two to five proximal spines present and six tubercle; carpus triangular, with one strong spine on both dorsal and ventral distal margins; mesial surface with two large distal spine and five spinules on upper region; palm 3.1 times as long as broad; dorsal margin mesially armed with a median spine; ventral margin carinated distally, extending up to fixed finger; fixed finger shorter than dactylus; four to five denticles present on cutting edge, granulated; dactylus long,

slender; lateral and mesial surface flanked on each side by longitudinal ridge, which bearing a series of setae; cutting edges with a series of tubercles (figs. 3.51d, e & f); sub-distal spine present on merus of P2; propodus stout; about 1.5 times as long as broad; dactylus conical with slight longitudinal upper groove (fig. 3.51g); telson sub-square; lateral margin of posterior half concave; posterior margin with obsolescent median spine; transverse proximal ridge clear; uropodal endopod triangularly bulging on posterolateral angle; bearing mesial ridge; exopods posteriorly broad, with convex distal margin (fig. 3.51h).

Coloration- Carapace and first pereiopod are dark browns. Abdominal somites and telson are light browns. The posterior margin of the carapace is with a black outline.

Zonation and Habitat- This species has been collected from the muddy bottom of the coral reef.

Distribution- This species is previously reported from Madagascar, Red Sea, Persian Gulf, Sri Lanka, India, Mergui Archipelago, Vietnam, South China Sea, Hong Kong, Japan, Philippines, Indonesia, Papua New Guinea, Samoa, Australia (Naderloo and Türkay, 2012).

In India, the species is the first time reported from Gujarat.

Commercial/Ecological Importance- *U*. carinicauda is a burrowing mud shrimp found in the intertidal area of sand-muddy, rocky, and coral reefs. These species play an important role in sediment bioturbation.

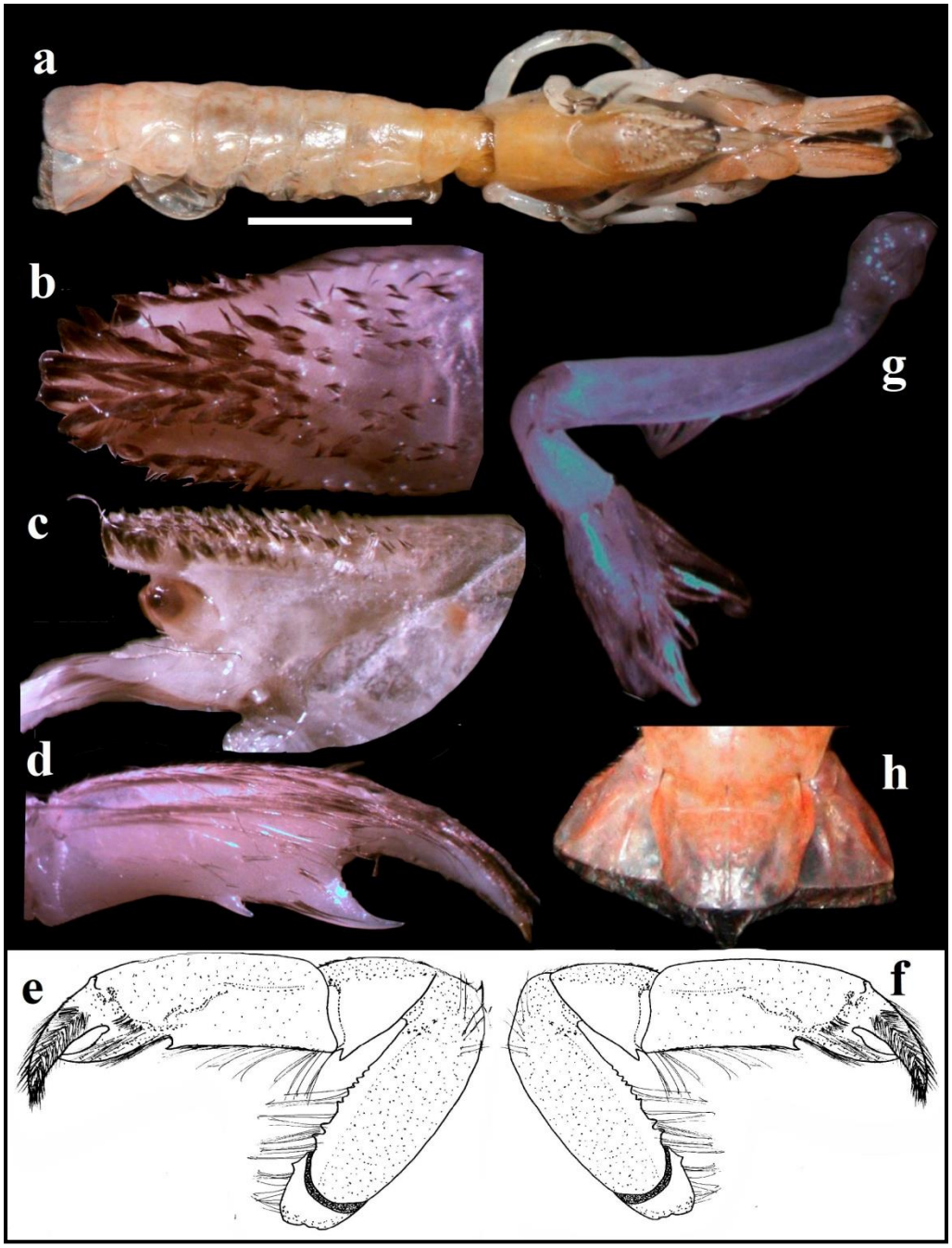

Figure 3.51 *Upogebia carinicauda* (Stimpson, 1860): a. Male dorsal view; b. Carapace; c. Carapace; d. Dactylus and fixed finger of the first cheliped; e. First pereiopod; f. Major cheliped; g. Second pereiopod; h. Telson. (Scale bar: =0.5 mm).

Infraorder **Stenopodidea Bate, 1888**

Euzygida Burkenroad, 1981: 251-268.

Diagnosis-Body lobster-like; carapace more or less cylindrical; gills trichobranchiate; eyes stalk compound; biramous antennules; antennae with five segmented peduncles; scaphocerites present; abdominal somites with pleura not expanded, overlapping in sequence posteriorly; pereiopods uniramous, P1 to P3 chelated, P3 longer than others, without exopods; pleopods uniramous in male and female; male without petasma, appendix internae and masculinae; female gonopores present on coxae of P3; on P3 in males; eggs attached to pleopods setae on females, hatch as zoeae; uropods biramous; telson broad.

Key to the Family of the Infraorder Stenopodidea occurring in India (in Gujarat*)

1. Body compressed, telson subtriangular with two strong spines at the end, uropodal endopods with two strong longitudinal ridges…… **Stenopodidea**

— Body depressed telson rounded or subquadrangular with three to five strong spines at the end, uropodal endopods with a single strong longitudinal ridge…… **Spongicolidae***

Family **Spongicolidae Schram, 1986**

Spongicolidae Schram, 1986: 284.

Diagnosis-Body depressed; carapace with few microscopic spines; propodus of Mxp2 with unarmed lower margin; Mxp3 without exopod or rudimentary; arthrobranchs on all three maxillipeds; epipods on all three maxillipeds, they may be absent on all pereiopods, or present on first three or four pairs; chela of P1 propodus broad and robust; uropodal endopod with single strong longitudinal dorsal ridge, rarely with few small sharp teeth; telson rounded or sub quadrangular, posterior margin with three to five subequal sharp spines.

Key to the Genera of the Family Spongicolidae Schram, 1986 occurring in India (in Gujarat *)

1. Dactylus of P4 and P5 biunguiculate or triunguiculate, short……..…… 2
—Dactylus of P4 and P5 uniunguiculate, long and slender…. *Engystenopus*
2. Carapace highly spinose, scaphocerite slender or broad, short; Mxp3 with long exopod, P1 with setiferous organ under carpus and propodus…….. ***Microprosthema****
—Few spines present on carapace, length of propodus of P3 nearly equal to width, chela or upper and lower margin serrated…….. *Spongicola*

Genus ***Microprosthema*** **Stimpson, 1860**

Stenopusculus Richters, 1880: 139-178, plts. 15-18

Diagnosis- Carapace highly spinose; scaphocerite short, broad or slender; P1 with setiferous organ under carpus-propodus; P3 longer than other; P4 and P5 with a carpal spine on ventral side; Mxp3 with exopod; telson with one lateral tooth.

52. ***Microprosthema validum*** **Stimpson, 1860** (fig. 3.52)

Microprosthema valida Stimpson 1860: 22-47.
Stenopus robustus Borradaile 1910: 257-264, fig. 4, plt. 16.
Stenopusculus crassimanus Richters 1880: 139-178, figs. 27-29, plts. 15-18.
Microprosthema validum Holthuis, 1946: 50, fig. h, plt. 3.

Materials Examined- 1 male (TL-1.4 cm, CL-.52), (ZL-AR-PR-38), Pirotan Island (23˚36’14” N 69˚57’30” E), Jamnagar District, 22 October 2015, coll. Barkha Purohit.

Diagnosis- Body robust with a hard skeleton or stony in appearance; eyestalk bearing two spines on inner region (fig. 3.52a); rostrum short, tapering and slightly curved downwards, armed with six dorsal spines; carapace border than longer, covered by spinules, anterior portion rather strong, a longitudinal row of three spines from base of rostrum to cervical groove (fig. 3.52b). Ischium Mxp3 longer than merus, armed with three spines, among the distal one is strongest; inner region with minute spine, merus narrow with two large spines (fig. 3.52d); first abdominal segment

carinated, bearing a distinct spine near the base of pleuron; second abdominal segment carinated transversely with two prominent projection near the base of pleuron; third abdominal segment divided into two portions by transverse carina, hind portion longer, transverse carina interrupted at four places forming three teeth; fourth and fifth abdominal segments glabrous, dorsal carina reduced, pleura ends with a pointed tip, no additional spine present (fig. 3.52c); P1 slender and shorter; all segment smooth; P2 similar to P1 but longer than first; anterior region of merus with three spines; P3 strong, carpus shorter than propodus, carinated dorsally and concave from inside; some spinules and three spines present on dorsal side; spinules present on both dorsal and ventral margins; propodus swollen but rather narrow; dorsal margin fully serrated about twenty teeth and anterior half of ventral margin also serrated with fifteen teeth; dactylus (half) as long as propodus, cutting edge with a large median tooth which fits in the concavity between two teeth present on cutting edge of immovable finger (fig. 3.52e); P4 and P5 long and similar in shape; dactylus compressed laterally and biunguiculate; propodus three times longer than dactylus, not segmented; carpus longer than propodus and subdivided into four parts; base of the telson as long as uropods, distal part narrow, two longitudinal carina present with three spines, each spine with a hair at outer base; one spinule present near base (fig. 3.52f); three pair denticulate teeth present on endopod of uropods and seven teeth on exopod.

Coloration- Carapace is reddish-orange at the base of the rostrum and pale-yellow patches present on the inner region. The outer margins of abdominal segments are reddish, and red chromatophores are scattered on the whole surface. The color of the third pereiopod is similar to the carapace, and fingertips are whitish. Other pereiopods are light pink.

Zonation and Habitat- This species has been collected from the shallow coral reef and rocky rubbles area.

Distribution- This species is broadly distributed throughout the Indo-West Pacific, Mauritius, Red Sea, Djibouti, Persian Gulf, Pakistan, Chagos Archipelago, India, Peninsular Malaysia, Japan, Indonesia (Java), and Australia (Naderloo and Türkay, 2012).

In India, the species is previously reported from the East coast: Palk Bay (Gravely, 1927) and Gulf of Mannar (Pillai, 1962).

Commercial/Ecological importance- *M. validum* is also known as reef shrimps or coral shrimps. They are commensalism to corals.

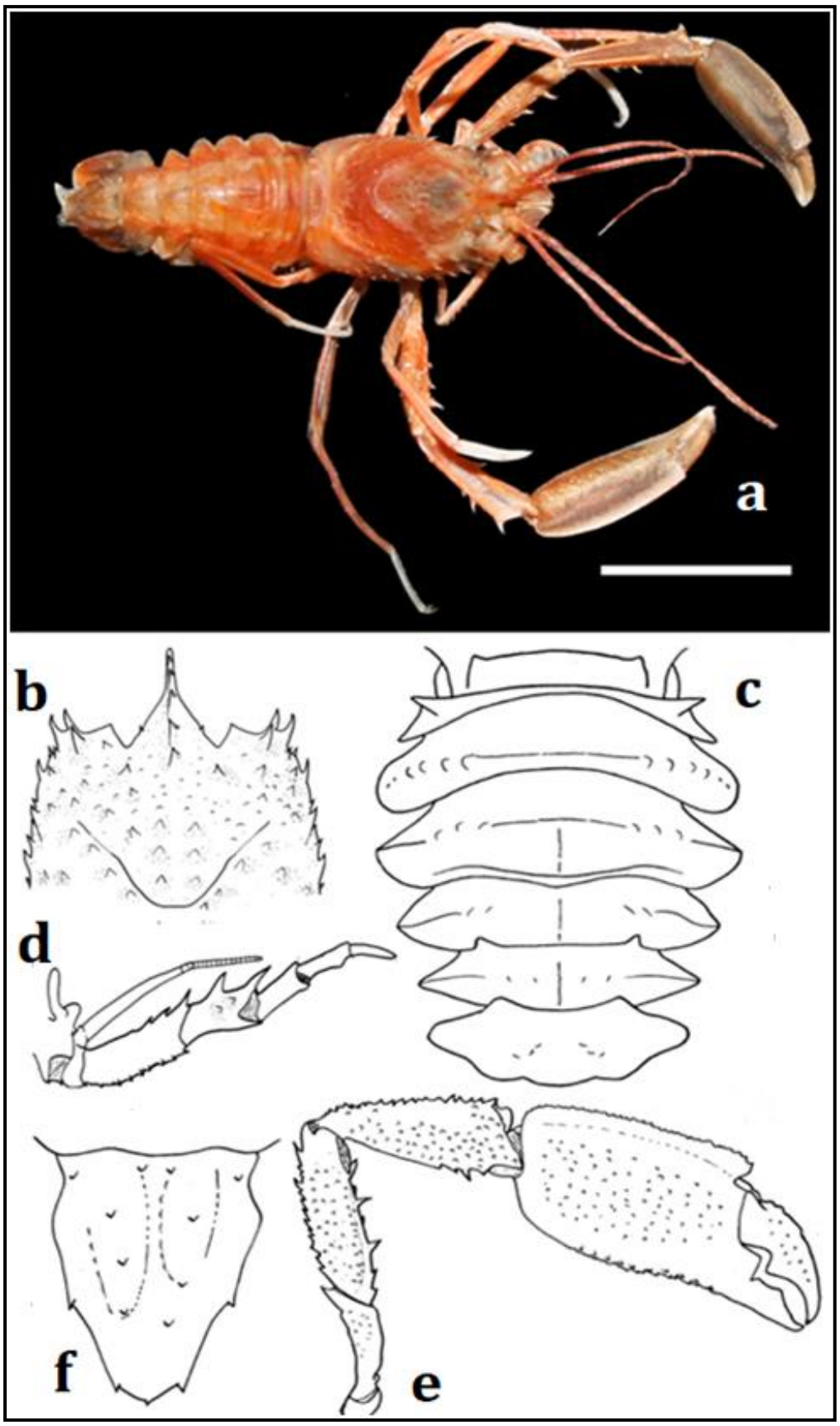

Figure 3.52 *Microprosthema validum* Stimpson, 1860: a. Male dorsal view;

b. Carapace; c. Abdomen; d. Third maxilliped; e. First cheliped; f. Telson. (Scale bar=0.5cm).

1.4 Discussion

The morphological examination of all the specimens collected from the Gujarat coast of India resulted in identifying 52 different species of prawn and shrimps belonging to 27 genera, 11 families, and 4 superfamilies. Under Suborder Dendrobranchiata and Pleocyemata, 2 families, 10 genera and 9 families, and 17 genera were identified. Family Penaeidae comprised the maximum number of species diversity (25 species, 9 genera), followed by the family Alpheidae (8 species, 3 genera), Plaemonidae (6 species, 4 genera), Hippolytidae (3 species, 3 genera), Solenoceridae (3 species, 1 genus), Callianassidae (2 species, 2 genera), whereas families Lysmatidae, Thoridae, Pandaloidea, Upogebiidae and Spongicolidae each comprised with a single species (Table 1.1). Among the infraorder Caridea, the superfamily Alpheoidea dominated the number of species (13), representing 25% of the total species. Following the family-wise contribution (fig. 3.53). The analysis reveals 48% of the species are contributed by the family Penaeidae, followed by the family Alpheidae (15%), Plaemonidae (11%). Families Hippolytidae and Solenoceridae have contributed 6% each of the total species diversity.

Among commercial shrimp species, *Megokris granulosus* (Haswell, 1879)**,** *Megokris sedili* (Hall, 1961), and *Parapenaeus fissuroides indicus* Crosnier, 1986 belonging to the family Penaeidae were first time reported from Gujarat. *Solenocera choprai* Nataraj, 1945 is also the first time sited from Gujarat waters. This species is distinguishable by postrostral carina markedly elevated and laminose, which is low and rounded in closely similar species *S. crassicornis* and the anterior part of the hepatic carina differently shaped (Dineshbabu, 2013). *Athanas parvus* de Man, 1910, and *Alpheus chiragricus* H. Milne Edwards, 1837, belonging to the family Alpheidae is the first time reported from India.

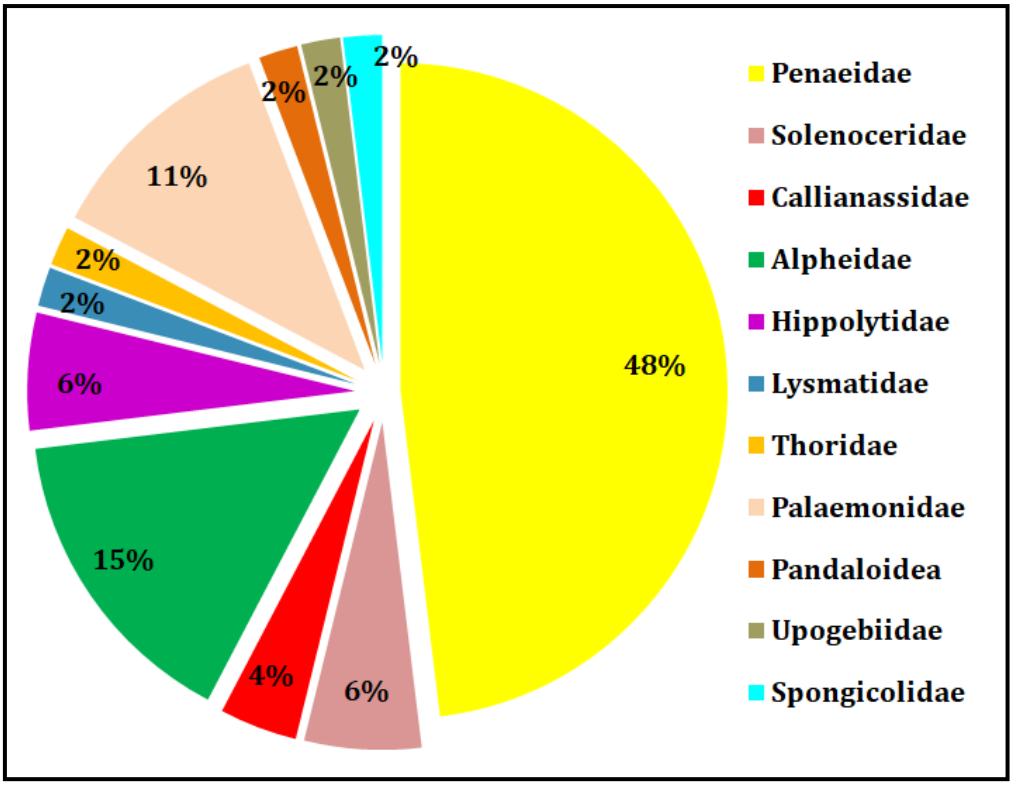

Figure 3.53 showing the family-wise contribution of the species collected during the present study.

Athanas parvus is widely distributed along the Indo-west pacific (Anker and De Grave, 2016), and during this study, we recorded its new distributional range. *Alpheus chiragricus* is closely similar to *A. Edwards* group species. This species can be differentiated from all other Indo-west Pacific species by the sharp ventral and dorsal shoulders of the major chela (Banner and Banner, 1982), as well as by its color pattern. *Alpheus edwardsii* belonging to the family Alpheidae is reported for the first time from Gujarat. These species are distinguished by the shape and color of the dactylus plunger of the major chela and the color pattern of the abdomen. These groups need the taxonomic revision based on the re-examination of Banner and Banner (1972) neotype of *A. edwardsii*. *Alpheus lobidens* are distributed along all the major coastal regions of Gujarat. This species is undoubtedly a complex of several cryptic species, some common and widely distributed across the Indo-west Pacific, other species possibly more restricted in their distribution range (Anker and De Grave, 2016). This species complex needs a detailed taxonomic revision, involving the re-

examination of the dry holotype of *A. lobidens*, and the type material of *A. crassimanus* Heller, 1865, *A. inopinatus* Holthuis & Gottlieb, 1958 and *A. lobidens polynesica,* including the molecular study. Sponge-dwelling shrimp *Synalpheus coutierei* Banner, 1953, is the first time reported from the West coast of India. This species is widely distributed along the Indo-West Pacific. *S. coutierei* is closely similar to *S. bispinosus* De Man, 1910, from which it can be distinguished by the blunt posterolateral angles of the sixth abdominal somite (*vs.* acutely pointed in *S. bispinosus*) (Wang and Sha, 2015).

The ghost shrimp species *Gilvossius rotundicaudatus* (Stebbing, 1902) belonging to the family Callianassidae is the first time reported from India. In 2003, Ngoc-Ho had revised the taxonomic status and placed it in the genus *Pestarella,* which was previously placed under the genus *Callianassa* Leach, 1814. In the genus *Callianassa,* the telson is squarish in the posterior half, but in the case of genus *Pestarella,* the telson is rounded in the posterior half, and the first two pereiopods are not present in the male. Recently *Pestarella rotundicaudata* (Stebbing, 1902) is considered as a synonym of G*. rotundicaudatus*. *Neocallichirus jousseaumei*is the second time reported from India. This species was previously reported by Beleem et al. (2019) from the Saurashtra coast. The specimen observed during the present study is larger (TL-96.49 mm, CL-24.09 mm) than the male specimen (TL-85 mm, CL- 22.8 mm), NHMW 25033 (PD112) observed by Dworschak (2011).

Thor amboinensis (de Man, 1888), known as squat shrimp or sexy shrimp, is the first time reported from the west coast of India. This species is previously known from the east coast of India (Kemp, 1916; 1925). Stenopodidean shrimp *Microprosthema validum* Stimpson, 1860, is the first time reported from the West coast of India. These species were reported from the Palk Bay (Gravely, 1927) and the Gulf of Mannar (Pillai, 1962). This species is closely similar to *M. semilaeve. Microprosthema validum* differentiated based on the coloration from *M. semilaev*e, which has median longitudinal carinae on the third to fifth abdominal segments.

The scaphocerite is relatively narrow, with two or three sharp obtuse teeth on the outer margin.

The burrowing mud shrimp *Upogebia carinicauda* (Stimpson, 1860) is the first time documented from Indian waters. Previously *Upogebia (Upogebia) kempi* Sankolli, 1972, was reported from Maharashtra state and considered as a junior synonym of *U. carinicauda.* Now *Upogebia (Upogebia) kempi* is accepted as *Upogebia kempi* Shenoy, 1967. Other intertidal shrimp species like *Lysmata vittata* (Stimpson, 1860), *Cuapetes grandis*, and *Palaemon pacificus* (Stimpson, 1860) are the first time documented from the Gujarat coast. The present study showed that the coastal area of the Gujarat state supports a huge diversity of prawns and shrimps, and detailed taxonomic studies are still required to carve a clear picture of the intertidal shrimp fauna of Gujarat.