

A Study on the Zoogeography of Indian Penaeidae

Angsuman Chanda*

Post Graduate Department of Zoology, Raja NL Khan Women's College, Gope Palace, Midnapur, Paschim Medinipur-721 102, WB, India

Abstract

From the distributional point of view of Penaeid prawn, Indian region in the present study is divided into three main sub-regions viz., East Coast, West Coast including Laccadive-Minicoy Islands and Andaman Islands. Present study also records existence of 79 species in the coastal water of India. Out of 79 species 9 are endemic, 24 are common in east coast, west coast and Andaman Islands; 16 species are restricted to East coast, 13 are restricted to west coast, 2 are restricted to Laccadiv Islands, 3 species are restricted to Andaman Islands only. Global Analysis shows that most species are distributed within Indo-West Pacific region and only 6 species are distributed up to east Atlantic region. A statistical analysis based on the distribution of prawn shows more moderate similarity between east coast and west coast in India and strong similarity between sub-region 1 and 4 of Indo-West Pacific indicates that the Indian species are more common with Indonesian and Indo-Malaysian than East African species.

Keywords: Distribution; Penaeid prawn; Indian region; Global

Introduction

Shrimps and Prawns of various kinds have certainly been a source of protein for human consumptions from very early times. Within historical times reference is made to prawn in ancient Chinese and Japanese literature. Usage of the term 'Prawn' and 'Shrimp' are somewhat confusing. In some western literature the term 'Shrimp' is applied for Penaeoidea and Sergestoidea, but in the east these are called 'Prawn'. Holthuis [1] discussed the contradiction but did not arrive at any conclusion. In the Prawn Symposium of the Indo-Pacific Fisheries Council held at Tokyo in 1955 it was decided that the word 'Prawn' should be applied to the Penaeids, Pandalids and Palemonids while 'Shrimp' to the smaller species belonging to the other families [2]. As such in the present study the term 'Prawn' is used for all the species belonging to family Penaeidae. Among a variety of edible decapod crustaceans, prawns contribute largely to the fishery wealth of many nations. Exploitation of prawn resource from the seas around each country is playing increasingly significant role in furthering their national economy. In recent years, in spite of some ecological hazards, the demand for prawns and prawn products has increased so much that every country is making efforts to utilize hitherto unknown but usable stocks and expansion of prawn fisheries and industries near coast line is rightly being given the maximum encouragement in the development programme of each nation. Therefore, the distribution of different species gradually extending their range of distribution and newer species were recorded throughout coastal region of each nation.

According to distribution of penaeid prawns, Indian region has been divided into three main sub-regions viz., East coast, West coast including Laccadive-Minicoy Islands and Andaman Islands (Table 1). The sub-region wise distribution of penaeid prawn has been shown in Table 2. Sorensen's quotient of similarity has been included in Table 3. Shallow and warm water marine areas of the world were classified into four zoogeographic regions namely Indo-West Pacific, Eastern Pacific, Western Atlantic and Eastern Atlantic regions [3]. Each region is further divided into several sub-regions. Since penaeid prawns are mostly distributed in these regions and sub-regions Dall et al., [3] have designated those as penaeid zoogeographical regions and sub-regions.

Materials and Methods

The present study is mainly based on the specimens collected by

the author from different commercial fish landing centres throughout Indian coast line (Figure 1). In addition to this penaeid prawns preserved in the National Collection of the Zoological Survey of India, Kolkata, India; Central Marine Fishery Research Institute, Cochin, Kerala and its regional stations at Mandapam, Tamil Nadu and National Institute of Oceanography have also been studied.

The collected materials were preserved in rectified spirit (90%) and body parts of taxonomic importance have been dissected and studied under a stereoscopic binocular microscope and identified. All the materials were registered and preserved in the national collection of Zoological Survey of India, Kolkata.

Results

Indian distribution

The present study records existence of 79 species of penaeid prawn in the coastal water of India. A look into the Table 2 reveals that East coast has 58 species, West coast 55 and Andaman Island has 34 species. Out of the 79 species recorded in this dissertation 24 species namely *Penaeus indicus* H. Milne Edwards, 1837, *P. merguensis* De Man, 1888, *P. monodon* Fabricin 1798, *P. semisulcatus* De Haan, 1844 *P. japonicus*

Sl. No.	Indian Subregions	Total No. of species	Endemic species
1.	East Coast: West Bengal, Orissa, Andhra Pradesh, Tamil Nadu	58	3
2.	West coast including Laccadive Islands: Gujarat, Maharashtra, Goa, Karnataka, Kerala	55	4
3.	Andaman Islands.	34	2

Table 1: Penaeid species including endemic species found in various Zoogeographical subregions of India.

*Corresponding author: Angsuman Chanda, Post Graduate Department of Zoology, Raja N. L. Khan Women's College, Gope Palace, Midnapur, Paschim Medinipur-721 102, W.B, India, Tel: 9932675019; E-mail: angsumanchanda@yahoo.in

Received October 21, 2016; Accepted December 06, 2016; Published December 12, 2016

Citation: Chanda A (2016) A Study on the Zoogeography of Indian Penaeidae. J Marine Sci Res Dev 6: 217. doi: 10.4172/2155-9910.1000217

Copyright: © 2016 Chanda A. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

Sl. No.	Name of genera, species & subspecies	East coast (EC)	West coast including Laccadive (WC)	Andaman Islands (AI)	Endemic
	<i>Alcockpenaeopsis</i> Chanda, 2016				
1	<i>Alcockpenaeopsis uncta</i> (Alcock, 1905)	+	+	-	-
	<i>Atypopenaeus</i> Alock, 1905				
2	<i>A. compressipes</i> (Henderson, 1893)	+	+	-	-
3	<i>A. stenodactylus</i> (Stimpson, 1860)	-	+	-	-
	<i>Batepenaeopsis</i> Chanda, 2016				
4	<i>B. acclivirostris</i> (Alcock, 1905)	+	+	-	-
5	<i>B. tenella</i> (Bate, 1888)	+	-	-	-
	<i>Funchalia</i> Johnson, 1867				
6	<i>F. danae</i> Burkenroad, 1940	-	+	-	-
7	<i>F. villosa</i> (Bouvier, 1905 b)	-	+	+	-
8	<i>F. woodwardi</i> Johnson, 1867	-	+	+	-
	<i>Helleropenaeopsis</i> Chanda, 2016				
9	<i>H. cultirostris</i> (Alcock, 1906)	+	-	-	-
10	<i>H. hardwickii</i> Miers, 1878	+	+	-	-
11	<i>H. indica</i> (Muthu, 1972)	+	-	-	-
12	<i>H. sculptilis</i> (Heller, 1862)	+	+	+	-
	<i>Kishinouyepeneopsis</i> Chanda, 2016				
13	<i>K. cornuta</i> (Kishinouye, 1900)	+	+	+	-
14	<i>K. maxillipedo</i> (Alcock, 1906)	+	+	-	-
	<i>Megokris</i> Pérez Farfante and Kensley, 1997				
15	<i>M. granulosus</i> (Haswell, 1879)	+	-	-	-
16	<i>M. pescadoreensis</i> (Schmitt, 1931a)	+	+	-	-
17	<i>M. sedili</i> (Hall, 1961)	+	+	-	-
	<i>Metapeneopsis</i> Bouvier, 1905				
18	<i>M. andamanensis</i> (Wood-Mason, 1891)	-	+	+	-
19	<i>M. barbata</i> (De Haan, 1844)	+	-	-	-
20	<i>M. commensalis</i> Borradaile, 1898	-	+	-	-
21	<i>M. coniger</i> (Wood-Mason, 1891)	+	+	+	-
22	<i>M. ceylonica</i> Starobogatov, 1972	+	-	-	-
23	<i>M. gaillardi</i> Crosnier, 1991	+	+	-	-
24	<i>M. gallensis</i> (Pearson, 1905)	+	-	-	-
25	<i>M. hilarula</i> (De Man, 1911)	+	+	-	-
26	<i>M. mogiensis</i> (Rothbun, 1902)	+	+	+	-
27	<i>M. novaeguineae</i> (Haswell, 1879)	+	-	-	-
28	<i>M. palmensis</i> (Haswell, 1879)	+	-	-	-
29	<i>M. philippii</i> (Bate, 1881)	-	+	-	-
30	<i>M. stridulans</i> (Alcock, 1905)	+	+	+	-
31	<i>M. toloensis</i> Hall, 1962	+	-	+	-
	<i>Metapenseus</i> Wood-Mason, 1891				
32	<i>M. affinis</i> (H. Milne Edwards, 1837)	+	+	+	-
33	<i>M. alcocki</i> George and Rao, 1968	-	+	-	+
34	<i>M. brevicornis</i> (H. Milne Edwards, 1837)	+	+	+	-
35	<i>M. bengalyensis</i> Tirmizi, 1971	+	-	-	+
36	<i>M. dobsoni</i> (Miers, 1878)	+	+	+	-
37	<i>M. eboracensis</i> Dall, 1957	+	-	-	-
38	<i>M. elegans</i> De Man, 1907	+	-	+	-
39	<i>M. endeavouri</i> (Schmitt, 1926a)	+	-	-	-
40	<i>M. ensis</i> (De Haan, 1844)	+	+	+	-
41	<i>M. intermedius</i> (Kishinouye, 1900)	-	-	+	-
42	<i>M. krishnatrii</i> (Silas and Muthu, 1976)	-	-	+	+
43	<i>M. kutchensis</i> George, George and Rao, 1963	-	+	-	+
44	<i>M. lysianassa</i> (De Man, 1888)	+	+	+	-
45	<i>M. monoceros</i> (Fabricius, 1798)	+	+	+	-
46	<i>M. moyebi</i> (Kishinouye, 1896)	+	+	+	-
47	<i>M. stebbingi</i> Nobili, 1904	-	+	-	-
	<i>Miyadiella</i> Kubo, 1949				
48	<i>M. podophthalmus</i> (Stimpson, 1860)	-	+	-	-
	<i>Parapeneopsis</i> Alcock 1901				
49	<i>P. longirostris</i> Chanda and Bhattacharya, 2002.	+	-	-	+
50	<i>P. nana</i> Alcock, 1905	+	-	-	-
51	<i>P. stylifera cochinchensis</i> George, 1975	-	+	-	-
52	<i>P. stylifera coromandelica</i> Alcock, 1906	+	+	-	-
53	<i>P. stylifera stylifera</i> (H. Milne Edwards, 1837)	+	+	+	-
	<i>Perapeneus</i> Smith, 1885				
54	<i>P. fissuroides indicus</i> Crosnier, 1985	-	+	-	-
55	<i>P. fissurus</i> (Bate, 1881)	+	-	+	-
56	<i>P. investigatoris</i> Alcock and Anderson, 1899	+	+	+	-
57	<i>P. longipes</i> Alcock, 1905	+	+	-	-
58	<i>P. sextuberculatus</i> Kubo, 1949	-	+	-	-
	<i>Pelagopenaeus</i> Perez Farfante & Kensley, 1997				
59	<i>P. balboae</i> (Faxon, 1893)	-	+	-	-
	<i>Penaeopsis</i> Bate, 1881				
60	<i>P. edwardoi</i> Perez Farfante, 1977	+	-	-	-
61	<i>P. jerryi</i> Perez Farfante, 1979	+	+	+	-
62	<i>P. rectacuta</i> (Bate, 1881)	+	+	+	-
	<i>Penaeus</i> Fabricius, 1798				
63.	<i>P. canaliculatus</i> (Oliver, 1811)	+	+	+	-
64.	<i>P. hathor</i> Burkenroad, 1959	-	+	-	-
65.	<i>P. indicus</i> (H. Milne Edwards, 1837)	+	+	+	-
66.	<i>P. japonicus</i> (Bate, 1888)	+	+	+	-
67.	<i>P. konkani</i> (Chanda and Bhattacharya, 2003)	-	+	-	+
68.	<i>P. latusulcatus</i> (Kishinouye, 1896)	+	+	+	-
69.	<i>P. marginatus</i> (Randall, 1840)	+	+	-	-
70.	<i>P. merguensis</i> (De Man, 1888)	+	+	+	-
71.	<i>P. monodon</i> Fabricius, 1798	+	+	+	-
72.	<i>P. penicillatus</i> (Alcock, 1905)	+	+	-	-
73.	<i>P. semisulcatus</i> De Haan, 1844	+	+	+	-
74.	<i>P. silasi</i> Muthu & Motho, 1979	+	-	-	+

75.	<i>P. similis</i> (Chanda and Bhattacharya, 2000.)	-	-	+	+
	<i>Trachypenaeopsis</i> Burkenroad, 1934				
76.	<i>T. minicoyensis</i> Thomas, 1972	-	+	-	+
	<i>Trachysalambria</i> Burkenroad, 1934				
77.	<i>T. aspera</i> (Alcock, 1906)	+	-	+	-
78.	<i>T. curvirostris</i> (Stimpson, 1860)	+	+	+	-
79.	<i>T. fulva</i> (Dall, 1957)	+	-	-	-
	TOTAL	58	55	34	9

Table 2: Distribution of penaeid prawns in Indian subregion.

Region	Q/S Value	Remarks
EC vs WC	0.673	Moderately similar.
EC vs AI	0.608	Moderately similar.
WC vs AI	0.606	Moderately similar.

Table 3: Sorensen's quotient of similarity based on the distribution of penaeid fauna in India.

Bate, 1888, *P. canaliculatus* Olivier, 1811, *P. latisulcatus*; *Metapenaeopsis coniger*, *M. mogiensis*, *M. stridulaus* [4] *Metapenaeus affinis*, *M. brevicornis*, *M. dobsoni*, *M. ensis*, *M. lysianassa*, *M. monoceros*, *M. moyebi*, *Helleropenaeopsis sculptilis*, *Kishinouyepenaeopsis cornuta*,

Parapenaeopsis stylifera, *Parapenaeus investigatoris* Alcock and Anderson [4], *Panaeopsis jerryi* Pérez Farfante, *P. rectacuta* and *Trachysalambria curvirostris* are found both in East coast, West Coast and Andaman Islands. 10 species namely *Atypopenaeus compressipes*, *Penaeus penicillatus* [4], *P. marginatus*, *Megokris sedili*, *Metapenaeopsis hilarula*, *Batepenaeopsis acclivirostris* [4], *Alcockpenaeopsis unclta* [4], *Helleropenaeopsis hardwickii*, *Kishinouyepenaeopsis maxillipedo* Alcock [4] and *Parapenaeus longipes* Alcock [4] are found in East and West coast but not in Andaman Islands. 4 species namely *Metapenaeopsis toloensis*, *Metapenaeus elegans* De Man, 1907, *Parapenaeus fissurus* and *Trachysalambria aspera* [4] are common in East coast and Andaman Islands. 2 species namely *Funchalia woodwardi* Johnson, 1867 and *Metapenaeopsis andamanensis* are common in West coast and Andaman Islands. 12 species namely *Megokris granulosus*, *Metapenaeopsis barbata*, *M. gallensis*, *M. novaeguineae*, *M. palmensis*, *Metapenaeus bengalensis* Tirmizi, *M. eboracensis* Dall [3], *Batepenaeopsis tenella* (Bate, 1888), *Helleropenaeopsis cultirostris* Alcock [4], *Parapenaeopsis longirostris* Chanda and Bhattacharya, 2004; *P. nana* Alcock [4] and *Panaeopsis eduardoi* Pérez Farfante, 1977 are restricted to East coast only. 10 species namely *Atypopenaeus stenodactylus*, *Penaeus Konkani* [5], *Metapenaeopsis commensalis* Borradaile, 1898, *M. Philippii*, *Metapenaeus alcocki*, *M. kutchensis* George, George and Rao, *M. stebbingi* Nobili, 1904, *Miyadiella podophthalmus*, *Parapenaeus sextuberculatus*, and *Trachypenaeopsis minicoyensis* Thomas, 1972 are

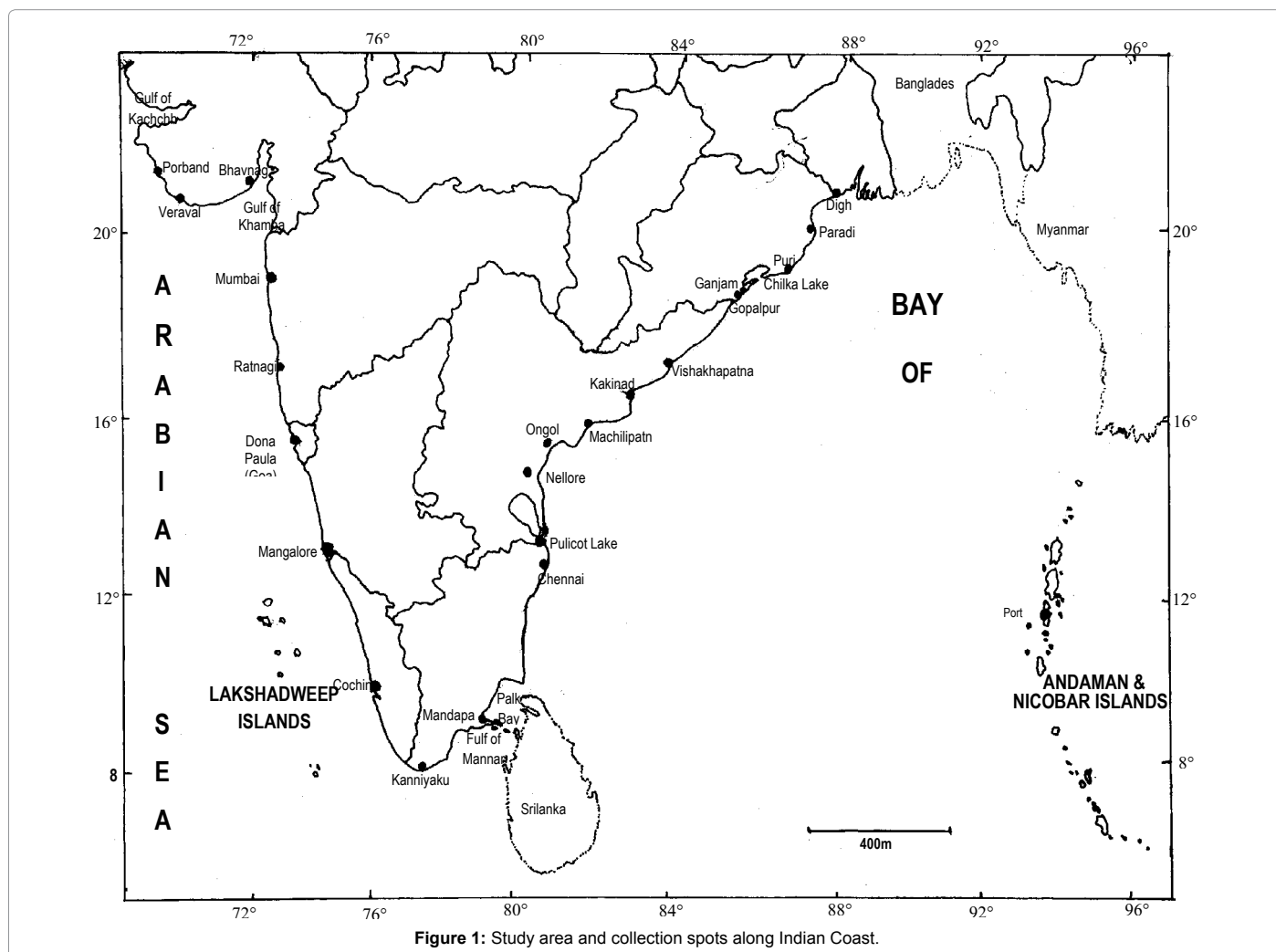


Figure 1: Study area and collection spots along Indian Coast.

restricted to west coast of which *M. commensalis* Borradaile, 1898 and *T. minicoyensis* Thomas, 1972 are restricted to Laccadive Islands. 3 species namely *Penaeus similis* [5]. *Metapenaeus intermedius* and *M. krishnatrii* Sisal and Muthu, 1976 are restricted to Andaman Island only. Two species have been recorded for the first time by Chanda [6] from India namely *Metapenaeopsis palmensis* and *Metapenaeus eboracensis* Dall, 1957, both from Andhra Pradesh in the east coast of India.

The present study also extends the limits of distributions of several earlier recorded species. Some of the species like *Metapenaeopsis toloensis* Hall, 1962 and *Metapenaeus elegans* De Man, 1907 which were previously recorded only from Andaman Sea have now been recorded from the eastern coast of mainland, India. In contrast to this *Penaeus indicus* H. Milne Edwards, 1837 which was earlier reported from east and west coast of main land, India [7] has now been recorded from Andaman Sea.

Penaeus latisulcatus Kishinouye, 1896 which was previously recorded only from west coast has now been recorded from east coast also. Likewise *Metapenaeus lysanassa* and *Penaeopsis acclivirostris* [4] was previously recorded only from east coast have now been recorded from west coast also.

In case of some species the limits of distributions have been extended either in east or west coast. For example northern limit of distribution in west coast has been extended upto Gujarat for *Atypopenaeus stenoductylus*, *Metapenaeopsis stridulans* [4], *Metapenaeus ensis* and *Helleropenaeopsis hardwickii*. Similarly northern limit of the distribution in east coast has been extended for *Metapenaeus ensis* and *Parapenaeopsis stylifera* up to Ganjatic delta and West Bengal and up to Andhra Pradesh for *Kishinouyepenaeopsis cornuta*. Present study also suggest that *Penaeus penicillatus* [4] has a broad range of distribution in both east and west coast and not restricted to Maharastra and Orissa coast as thought earlier by George [8].

Of these reported 79 species, 9 species are endemic to India and 4 of these are restricted to West coast including 2 in Laccadive Island, 2 are restricted to each coast and remaining 3 are restricted to Andaman Islands. Analysis of the Sorensen's quotient of similarity based on the distribution in three sub-regions of India revealed that penaeid fauna is moderately similar (0.61-0.70) among different sub-regions. As

expected similarity maximum between East and West coast (0.673) due to continuity of coast line and least between West coast and Andaman Island (0.606) due to distance.

Global distribution

Some penaeid prawns found in India (Indo-West Pacific region) are also distributed in Eastern Atlantic zoogeographic region but no species of this region is found in Eastern Pacific and Western Atlantic. The region and sub-regions wise distribution of Indian penaeids have been computed and shown in Tables 4 and 5. Of the 79 species reported here only 6 species are common with Eastern Atlantic region where they are found in the sub-region 2 (Mediterranean Sea) only. Most of the Indo-West Pacific Indian species are found in sub-region 1 and 4 (69 and 61 respectively). Some of the species are distributed as far as sub-regions 7, 8 and 9 [8-12].

Analysis of the Sorensen's quotient of similarity based on the distribution of species in different sub-regions of the Indo-West Pacific region (Table 6) revealed that as expected, penaeid species composition is strongly similar (>0.71) between sub-region 1 and 4. Slightly similar (0.51-0.60) species composition is seen between sub-region 1 and 2, 1 and 3 and 3 and 4. Species composition between sub-region 1 and 5, 2 and 4 and 4 and 5 are found to be moderately dissimilar. Species composition between sub-region 1 and 6, 1 and 7, 1 and 8, 1 and 9 and between remaining other sub-regions it is found to be strongly dissimilar as compare to sub-region 4.

Such pattern of distribution is quite expected and can be correlated with the distance. Coastal continuity between East and West coast of India is the cause of the moderate to strongly (>0.7) similar species composition. Relative proximity between the East African coast and the West Coast of India has resulted into the slightly similar species composition between these two sub-regions but a moderately dissimilar species composition has been observed between East coast of India and East African coast. As such distributional tendency of Indian penaeids towards east is more than west. Only 6 species of India has been found to be distributed outside Indo-West Pacific region and that too only found in Mediterranean sea. Such distribution in all probability is a recent phenomenon and might have arisen due to the dispersal of species through Suez canals which is also suggested by Dall [3].

Global penaeid zoogeographical area		Total No. of species	Endemic species
I.	Indo – West Pacific		
	Indian Ocean and Western part of Pacific Ocean are under the area	79	9
	Sub-regions:		
1.	Indo-Malaysian, Sri Lanka, Bay of Bengal, Philippines, Gulf of Tonkin, South Taiwan, Indonesia including northern West Irian, Northern Papua, New Guinea, Solomon Islands	69	4
2.	Tropical Australia – Torres Strait to Shark Bay. Gulf of Papua, wide Bay, Queensland.	28	
3.	Sino-Japanese, Gulf of Tonkin to Yellow Sea and the Inland Sea of Japan	28	
4.	Arabian Sea, West Coast of India through Arabian Sea, Gulf of Iran and Red Sea	61	5
5.	East African Coast, Cape Guardafui to Durban	21	
6.	South Africa, Durban to Swakopmunad	11	
7.	Southeastern Australia. Wide Bay to Bass strait	4	
8.	South Western Australia. Shark Bay of Vincents Gulf	5	
9.	Oceania. South and Central Pacific islands, including the Hawaiian Islands	12	
II.	Eastern Atlantic		
	Eastern part of Atlantic Ocean starting from Mediterranean Sea to South Angola		
	Sub-regions:		
1.	Eastern Atlantic, Lisbon, Portugal, 40°N, to Porto Alexandre, South Angola, 16°S.	0	
2.	Mediterranean Sea	6	

Table 4: Distribution of Indian penaeids including endemic species in global sub-regions.

Sl. No	Name of Genera & Species	Indo-West Pacific									Eastern Atlantic		
		1	2	3	4	5	6	7	8	9	1	2	
	<i>Alcockpenaeopsis</i> Chanda, 2016												
1.	<i>Alcockpenaeopsis uncta</i> (Alcock, 1905)	+	-	-	+	-	-	-	-	-	-	-	-
	<i>Atypopenaeus</i> Alcock, 1905												
2.	<i>A. compressipes</i> (Henderson, 1893)	+	+	-	+	-	-	-	-	-	-	-	-
3.	<i>A. stenodactylus</i> (Stimpson, 1860)	+	+	+	+	-	-	-	-	-	-	-	-
	<i>Batepenaeopsis</i> Chanda, 2016												
4.	<i>B. acclivirostris</i> (Alcock, 1905)	+	-	-	+	+	+	-	-	-	-	-	-
5.	<i>B. tenella</i> (Bate, 1888)	+	+	+	+	-	-	-	-	-	-	-	-
	<i>Funchalia</i> Johnson, 1867												
6.	<i>F. danae</i> Burkenroad, 1940	-	-	-	+	-	-	-	-	-	-	-	-
7.	<i>F. villosa</i> (Bouvier, 1905 b)	+	-	-	+	-	-	-	-	-	-	-	-
8.	<i>F. Woodwardi Johnson, 1867</i>	+	-	-	+	+	-	-	-	-	-	-	+
	<i>Helleropenaeopsis</i> Chanda, 2016												
9.	<i>H. cultirostris</i> (Alcock, 1906)	+	-	-	-	-	-	-	-	-	-	-	-
10.	<i>H. hardwickii</i> Miers, 1878)	+	-	+	+	-	-	-	-	-	-	-	-
11.	<i>H. indica</i> (Muthu, 1972)	+	-	-	-	-	-	-	-	-	-	-	-
12.	<i>H. sculptilis</i> (Heller, 1862)	+	+	-	+	-	-	-	-	-	-	-	-
	<i>Kishinouyepeneopsis</i> Chanda, 2016												
13.	<i>K. cornuta</i> (Kishinouye, 1900)	+	+	+	+	-	-	-	-	-	-	-	-
14.	<i>K. maxillipedo</i> (Alcock, 1906)	+	+	-	+	-	-	-	-	-	-	-	-
	<i>Megokris</i> Pérez Farfante and Kensley, 1997												
15.	<i>M. granulosus</i> (Haswell, 1879)	+	+	-	+	-	-	-	-	-	-	-	-
16.	<i>M. pescadorensis</i> (Schmitt, 1931a)	+	-	-	+	-	-	-	-	-	-	-	-
17.	<i>M. sedili</i> (Hall, 1961)	+	-	-	+	+	-	-	-	-	-	-	-
	<i>Metapeneopsis</i> Bouvier, 1905												
18.	<i>M. andamanensis</i> (Wood-Mason, 1891)	+	-	+	+	-	-	-	-	-	-	-	-
19.	<i>M. barbata</i> (De Haan, 1844)	+	-	+	+	-	-	-	-	-	-	-	-
20.	<i>M. commensalis</i> Borradaile, 1898	+	+	-	+	-	-	-	-	+	-	-	-
21.	<i>M. coniger</i> (Wood-Mason, 1891)	+	-	+	+	-	-	-	-	-	-	-	-
22.	<i>M. ceylonica</i> Starobogatov, 1972	+	-	-	-	-	-	-	-	-	-	-	-
23.	<i>M. gaillardi</i> Crosnier, 1991	+	-	-	+	-	-	-	-	-	-	-	-
24.	<i>M. gallensis</i> (Pearson, 1905)	+	+	+	+	-	-	-	-	-	-	-	-
25.	<i>M. hilarula</i> (De Man, 1911)	+	+	-	+	+	+	-	-	-	-	-	-
26.	<i>M. mogiensis</i> (Rothbun, 1902)	+	-	+	+	+	-	-	-	-	-	-	-
27.	<i>M. novaeguineae</i> (Haswell, 1879)	+	+	-	-	-	-	-	-	-	-	-	-
28.	<i>M. palmensis</i> (Haswell, 1879)	+	+	+	-	-	-	-	+	-	-	-	-
29.	<i>M. philippii</i> (Bate, 1881)	+	-	-	+	-	-	-	-	-	-	-	-
30.	<i>M. stridulans</i> (Alcock, 1905)	+	-	-	+	-	-	-	-	-	-	-	-
31.	<i>M. toloensis</i> Hall, 1962	+	+	-	+	-	-	-	-	-	-	-	-
	<i>Metapenseus</i> Wood-Mason, 1891												
32.	<i>M. affinis</i> (H. Milne Edwards, 1837)	+	-	-	+	-	-	-	-	+	-	-	-
33.	<i>M. alcocki</i> George and Rao, 1968	-	-	-	+	-	-	-	-	-	-	-	-
34.	<i>M. brevicornis</i> (H. Milne Edwards, 1837)	+	-	-	+	-	-	-	-	-	-	-	-
35.	<i>M. bengalyensis</i> Tirmizi, 1971	+	-	-	-	-	-	-	-	-	-	-	-
36.	<i>M. dobsoni</i> (Miers, 1878)	+	-	-	+	-	-	-	-	-	-	-	-
37.	<i>M. eboracensis</i> Dall, 1957	+	+	-	-	-	-	-	-	-	-	-	-
38.	<i>M. elegans</i> De Man, 1907	+	-	-	-	-	-	-	-	+	-	-	-
39.	<i>M. endeavouri</i> (Schmitt, 1926a)	+	+	-	-	-	-	-	-	-	-	-	-
40.	<i>M. ensis</i> (De Haan, 1844)	+	+	+	+	-	-	-	-	+	-	-	-
41.	<i>M. intermedius</i> (Kishinouye, 1900)	+	-	+	-	-	-	-	-	-	-	-	-
42.	<i>M. krishnatrii</i> (Silas and Muthu, 1976)	+	-	-	-	-	-	-	-	-	-	-	-
43.	<i>M. kutchensis</i> George, George and Rao, 1963	-	-	-	+	-	-	-	-	-	-	-	-
44.	<i>M. lysianassa</i> (De Man, 1888)	+	-	-	+	-	-	-	-	-	-	-	-

45.	<i>M. monoceros</i> (Fabricius, 1798)	+	-		+	+	+	-	-	-	-	+
46.	<i>M. moyebi</i> (Kishinouye, 1896)	+	-	+	+	-	-	-	-	-	-	-
47.	<i>M. stebbingi</i> Nobili, 1904	-	-	-	+	+	+	-	-	-	-	+
	<i>Miyadiella</i> Kubo, 1949											
48.	<i>M. podophthalmus</i> (Stimpson, 1860)	+	-	+	+	-	-	-	-	-	-	-
	<i>Parapenaeopsis</i> Alcock 1901.											
49.	<i>P. longirostris</i> Chanda and Bhattacharya,2002.	+	-	-	-	-	-	-	-	-	-	-
50.	<i>P. nana</i> Alcock, 1905	+	-	-	-	-	-	-	-	-	-	-
51.	<i>P. stylifera cochinensis</i> George, 1975	-	-	-	+	-	-	-	-	-	-	-
52.	<i>P. stylifera coromandelica</i> Alcock, 1906	+	-	-	+	-	-	-	-	-	-	-
53.	<i>P. stylifera stylifera</i> (H. Milne Edwards, 1837)	+	-	-	+	-	-	-	-	-	-	-
	<i>Perapenaeus</i> Smith, 1885											
54.	<i>P. fissurus</i> (Bate, 1881)	+	-	+	+	+	-	-	-	-	-	-
55.	<i>P.fissuroides indicus</i> Crosnier, 1985	-	-	-	+							
56.	<i>P. investigatoris</i> Alcock and Anderson, 1899	+	-	+	+	+	-	-	-	-	-	-
57.	<i>P. longipes</i> Alcock, 1905	+	-	+	+	+	-	-	-	-	-	-
58.	<i>P. sextuberculatus</i> Kubo, 1949	+	+	+	+	+	-	+	-	-	-	-
	<i>Pelagopenaeus</i> Perez Farfante & Kensley, 1997											
59.	<i>P. balboae</i> (Faxon, 1893)	-	-	-	+	-	-	-	-	-	-	-
	<i>Penaeopsis</i> Bate, 1881											
60.	<i>P. edwardoi</i> Perez Farfante, 1977	+	+	+	-	+	-	-	-	+	-	-
61.	<i>P. jerryi</i> Pérez Farfante, 1979	+	-	-	+	+	-	-	-	-	-	-
62.	<i>P. rectacuta</i> (Bate, 1881)	+	-	+	+	+	-	-	-	+	-	-
	<i>Penaeus</i> Fabricius, 1798											
63.	<i>P. canaliculatus</i> (Oliver, 1811)	+	+	+	+	-	-	-	-	+	-	-
64.	<i>P. hathor</i> Burkenroad, 1959	-	-	-	+	-	-	-	-	-	-	-
65.	<i>P. indicus</i> (H. Milne Edwards, 1837)	+	+	+	+	+	+	-	-	-	-	-
66.	<i>P. japonicus</i> (Bate, 1888)	+	+	+	+	+	+	-	-	-	-	+
67.	<i>P. konkani</i> (Chanda and Bhattacharya,2003)	-	-	-	+	-	-	-	-	-	-	-
68.	<i>P. latisulcatus</i> (Kishinouye, 1896)	+	+	+	+	+	+	-	+	+	-	-
69.	<i>P. marginatus</i> (Randall, 1840)	+	+	+	+	+	+	-	-	+	-	-
70.	<i>P. merguensis</i> (De Man, 1888)	+	+	-	+	-	-	-	-	+	-	-
71.	<i>P. monodon</i> Fabricius, 1798	+	+	+	+	+	+	+	+	+	-	-
72.	<i>P. penicillatus</i> (Alcock, 1905)	+	-	-	+	-	-	-	-	-	-	-
73.	<i>P. semisulcatus</i> De Haan, 1844	+	+	+	+	+	+	+	+	+	+	+
74.	<i>P. silasi</i> Muthu & Motho, 1979	+	-	-	-	-	-	-	-	-	-	-
75.	<i>P. similis</i> (Chanda and Bhattacharya,2002).	+	-	-	-	-	-	-	-	-	-	-
	<i>Trachypenaeopsis</i> Burkenroad, 1934											
76.	<i>T. minicoyensis</i> Thomas, 1972	-	-	-	+	-	-	-	-	-	-	-
	<i>Trachysalambria</i> Burkenroad, 1934											
77.	<i>T. aspera</i> (Alcock, 1906)	+	-	-	-	-	-	-	-	-	-	-
78.	<i>T. curvirostris</i> (Stimpson, 1860)	+	+	+	+	+	+	+	+	-	-	+
79.	<i>T. fulva</i> (Dall, 1957)	+	+	-	-	-	-	-	-	-	-	-
	TOTAL NUMBER OF SPECIES	69	28	28	61	21	11	4	5	12	0	6

Table 5: Zoogeographic distribution of penaeid species found in India.

*Subregion	1	4
1		
4	.785	
3	.577	.584
2	.577	.517
5	.444	.488
9	.296	.329
6	.275	.306
8	.135	.121
7	.110	.123

*Reference table number 5.

Table 6: Sorensen's quotient of similarity (Q.S).

Acknowledgements

Author is extremely indebted to Professor Tanmoy Bhattacharya, Ex-Emeritus Professor, Department of Zoology, Vidyasagar University; Dr. Probodh Kumar Maity, Emeritus scientist-SF, ZSI, Kolkata and Dr. Tusherendu Roy, Scientist-C, ZSI, Kolkata for their endless guidance and inspiration. Author expressed his gratitude to Prof. Samir Kumar Benerjee, Prof. of Zoology, Calcutta University for his inspiration during preparation of manuscript in present format. Author is also grateful to the Director, Zoological Survey of India for granting him a fellowship during which the work has been completed.

References

1. Holthuis LB (1980) FAO Species Catalogue-Shrimps and prawns of the world. *FAO Fish Synop* (125), 1: 1-271.
2. Kurian CV, Sebastian OV (1993) Prawns and Prawn Fisheries of India. Hindustan Publishing Corporation Delhi 1-267.
3. Dall W, Hill BJ, Rothlisberg PC, Sharples DJ (1990) The biology of the Penaeidae. *Adv Mar Biol* 27: 1-489.
4. Alcock A (1906) Catalogue of the Indian Decapod Crustacea in the collection of the Indian Museum. Part III. Macrura. Fasciculus I. The prawns of the *Peneus* group. Indian Museum, Calcutta: 1-55.
5. Chanda A, Bhattacharya T (2002) Penaeoid shrimp of Digha and adjacent coast of Midnapore, West Bengal, India. *Vidyasagar University J of Bio Sci* 8: 1-22.
6. Chanda A (2014) First Record of Two Australian Species : One under *Metapenaeopsis* and Another under *Metapenaeus* from Indian Water, Their Diagnosis and Distribution. *J Ento Zoo Studies* 2: 18-20.
7. George MJ (1972) On the zoogeographic distribution of Indian Penaeidae. *Indian J Mar Sci* 1: 89-92.
8. George MJ (1979) Taxonomy of Indian prawns (Crustacea, Decapoda, Penaeidae). "In contribution to Marine Science", dedicated to Dr CV Kurian: 21-59.
9. Chanda A (2016) A Study on Newly Described Genera *Alcockpenaeopsis*, *Batepenaeopsis*, *Helleropenaeopsis*, *Kishinouyepenaeopsis* and *Parapenaeopsis* from Indian Water. *Poult Fish Wildl Sci*, 4: 147.
10. Chanda A, Bhattacharya T (2003) *Fenneropenaeus konkani*, a new species of prawn (Decapoda: Penaeidae) from Indian Coast. *Science and Culture* 69: 229-230.
11. Gorge MJ, Suseelan C (1982) Distribution of species of prawn in the backwaters and estuaries of India with reference to coastal aquaculture. *Proc Symp Coast Aqua* 1: 273-284.
12. Sorensen T (1948) A Method of Establishing Groups of Equal Amplitude in Plant Sociology Based on Similarity of Species Content and Its Application to Analysis of the Vegetation of Danish Commons. *Biol Skr* 5: 1-34.