II SYSTEMATICS – TAXONOMIC CONSIDERATIONS AND GENERAL DISTRIBUTION

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The prawns and shrimps of commerce of India belong to 3 major families, namely Penaeidae, Palaemonidae and Sergestidae of the decapod suborder Natantia. A few deep water forms belonging to the family Pandalidae are also gaining commercial importance with the result of recent exploratory fishing activities. There has been much confusion in the usage of terms prawns and shrimps. At the Prawn Symposium of the Indo-Pacific Fisheries Council held at Tokyo in 1955 it was decided that the term prawn should be applied to the Penaeids, Pandalids and Palaemonids, while the use of the term shrimp should be restricted to the smaller forms belonging to other families. According to this most of the forms of economic importance here are to be termed prawns.

In order to identify the prawn either in the field of in the laboratory a knowledge of certain morphological characters is highly essential. Figs. 1 and 2 are diagrammatic representation of all these characters used in general in prawn systematics. Features of systematic importance are rostrum, carapace with the spines, carinae and sulcii, carination of the abdomen, telson, appendages and secondary sexual characters like petasma and appendix masculina in male and thelycum in female.

Key to families consisting of commercially important forms.

1. Pleurae of second abdominal somite overlapping those of first and third segments; no chelae on 3rd pereopods. Gills phylobranchiate.....2

   Pleurae of 2nd abdominal somite overlapping those of 1st segment; third legs with a chela.....4

2(1) Carpus of 2nd pair of pereopods divided into two or more articles; if not 1st pair pereopods not chelate.....3

   Carpus of 2nd pair of pereopods entire; no epipods on legs; upper antenular flagellum bifid; 3rd maxilliped normal.....Palaemonidae

3(2) Chelae of 1st pair of pereopods distinct both sides; ends of fingers of this chelas dark coloured; eyes free, never extremely elongate.....*Hippolytidae*
Chela of the 1st pair of pereopods microscopically small or absent; chelae of 2nd pair of pereopods small and slender.....*Pandalidae*

4(1) Last two pairs of walking legs well developed;
Gill many .....*Penaeidae*
Last one or two pairs of walking legs reduced of absent.
Gills few of wanting.....*Sergestidae*

Key to the commercial or potentially commercial species of prawns of the family Pandalidae

1. Carapace with longitudinal carinae of the lateral surfaces integument very firm. Pereopods of 2nd pair very unequal.....*Heterocarpus*
No longitudinal carinae on the carapace except for the postrostral crest; 3rd mixed with exopod.....2

2(1) Atleast the first 2 pereopods with epipods; posterior lobe of Scaphognathite truncate stylocerite pointed anteriorly.....*Plesionika*.....3
Pereopods without epipods; upper margin of rostrum finely and evenly serrate along its whole length; carpus of 5th leg shorter than propodus; minimum thickness of 6th abdominal somite, when looked at dorsally, 2/5 length of this somite, telson almost 11/2 as long as 5th somite .....*Parapandalus spinipes*

3(2) Posterior border of 3rd abdominal tergum acutely produced into a sharp tooth that overlaps the next tergum.....*Plesionika ensis*
Posterior border of 3rd abdominal tergum though convex is not acutely produced; Rostrum 45 to 67 percent of the length of the body from orbit to tip of the telson.....*Plesionika martia*

4(1) Abdominal terga, though carinated, never produced posteriorly into overhanging spines; post ocular carina present; upper margin of rostrum proper armed with 2 or 3 teeth .....*Heterocarpus gibbosus*
3rd abdominal tergum armed with an acute spine arising from the anterior half postocular carina completely wanting.....*Heterocarpus wood-masoni*

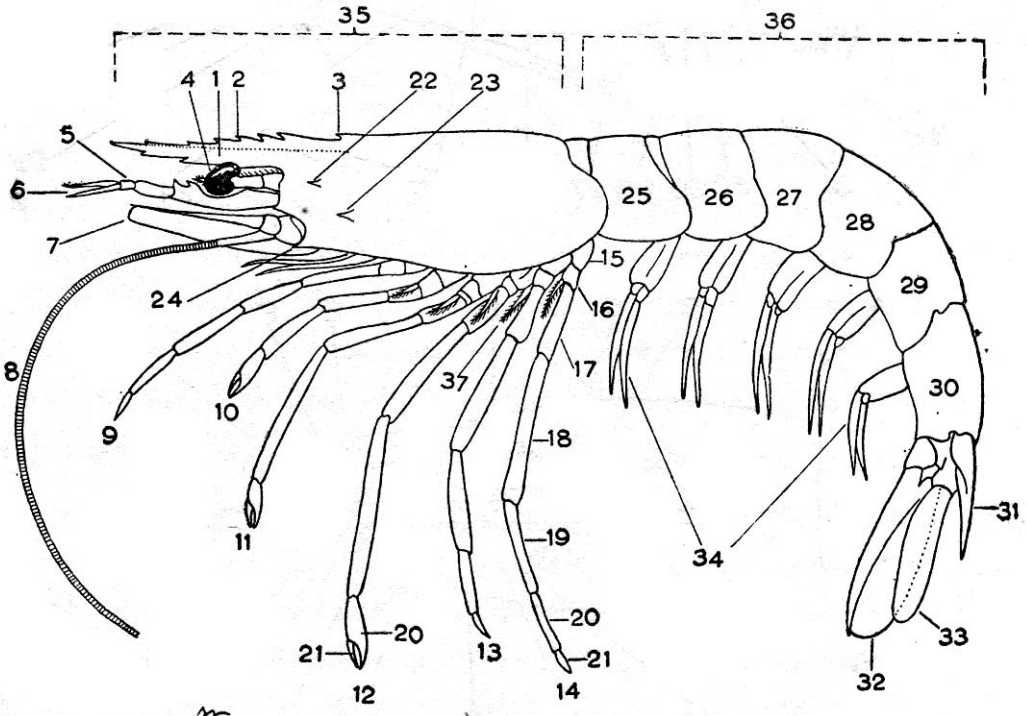
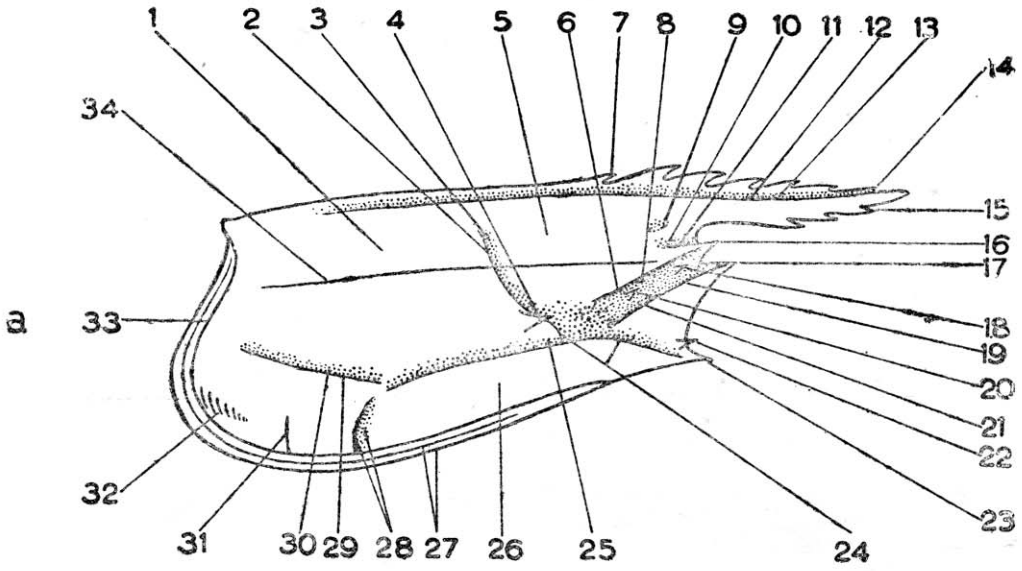


Fig. 1. Diagramatic drawing of a penaeid prawn to illustrate taxonomic characters. 1. Rostrum. 2. Rostral spines. 3. Epigastric spine. 4. Eye. 5. Antennule. 6. Antennular flagella. 7. Antennal scale. 8. Antennal flagellum. 9. Third maxilliped. 10–14. 1st-5th pereopods. 15. Coxa. 16. Basis. 17. Ischium. 18. Merus. 19. Carpus. 20. Propodus. 21. Dactylus. 22. Postorbital spine. 23. Hepatic spine. 24. Pterygostomian spine. 25-30. 1st-6th abdominal somites. 31. Telson. 32. Exopod of the uropod. 33. Endopod of the uropod. 34. Pleopods. 35. Carapace. 36. Abdomen.



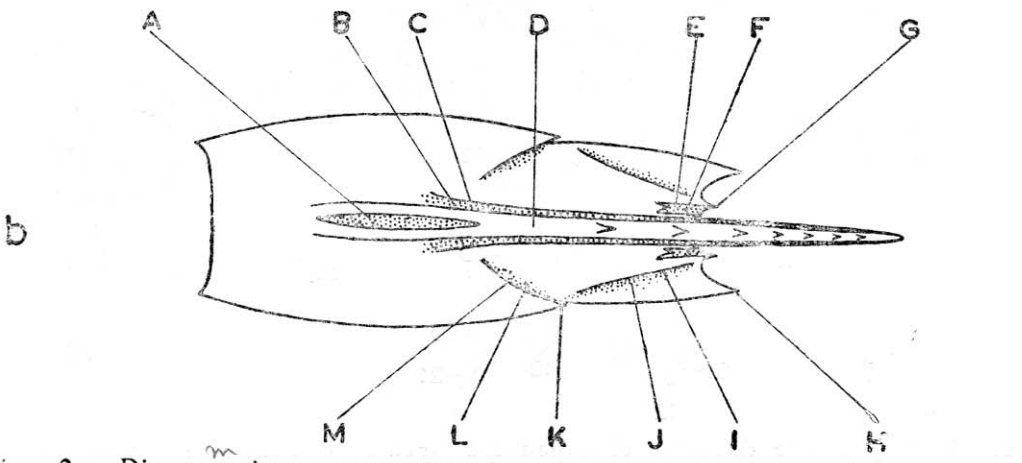


Fig. 2-a. Diagramatic representation of carapace to show features of taxonomic importance. 1. Cardiac region. 2. Cervical carina. 3. Cervical sulcus. 4. Hepatic spine. 5. Gastric region. 6. Gastro-orbital carina. 7. Epigastric spine. 8 Orbitoantennal sulcus. 9 Postocular sulcus. 10 Gastrofrontal sulcus. 11. Gastrofrotal carina. 12. Adrostral carina. 13. Adrostral sulcus 14 Rostral tooth. 15. Ventral rostral tooth. 16. Orbital or supra-orbital spine 17. Antennal spine. 18 Postorbital spine 19. Antennal carina. 20. Post antennal spine 21. Orbito-antennal sulcus. 22. Branchiostegal spine. 23. Pterygostomian spine. 24. Hepatic carina. 25. Hepatic sulcus. 26. Pterygostomian region. 27. Marginal region. 28. Inferior carina and sulcus. 29. Branchiocardiac carina. 30. Branchiocardiac sulcus. 31. Transverse suture. 32. Stridulating organ, 33. Pterygostomian sulcus. 34. Longitudinal suture.

Fig. 2-b. A. Postrostral or median sulcus. B. Adrostral sulcus. C. Adrostral carina. D. Postrostral carina. E. Gastrofrontal carina. F. Gastrofrontal sulcus. G. Orbital or Supra-orbital spine. H. Antennal spine. I. Gastroorbital carina J. Orbito-antennal sulcus, K. Hepatic spine. L. Cervical sulcus. M. Cervical carina.

Family Hippolytidae

Genus *Hippolysmata*

1. Rostrum shorter than carapace, without elevated basal crest; lateral margins of telson convex, apex blunt with a pair of spines.....*Hippolysmata vittata*

2. Rostrum longer than carapace, with an elevated dentate basal crest, lateral margins of telson concave, apex acute and unarmed.....*Hippolysmata ensirostris*

Key to commercially important coastal species (family Palaemonidae)

1. Branchiostegal spine present; mandible with a palp; eyes distinctly pigmented;first pleopod of male without or with a rudimental appendix interna on the endopod; branchiostegal spines present as a sharp line; propodus of 5th pereopod with transverse rows of sitae on the distal part of the posterior margin; the two median hairs of the posterior margin of telson are slender .....*Palaemon*.....2
   Branchiostegal spine absent; hepatic spine present; dactylus of last 3 legs simple .....*Macrobrachium*.....3

2(1) Dactylus of last three pereopods very long and slender; 4th and 5th pair excessively long, flagelliform with dactylus much longer than carapace; pleopods very long; 1st pair much longer than carapace, carpus of 2nd pereopod much more than half as long as palm; basal crest of rostrum with almost seven teeths.....*Palaemon tenuipes*
   Dactylus of last three pereopods not abnormal in length that of 3rd scarcely ½ length of propodus and that of 5th atmost 1/3 length of propodus. Pleopods normal in length; one or more subapical dorsal teeth on rostrum. Last four abdominal somites bluntly carinate dorsally .....*Palaemon styliferus*

3(1) Carpus of 2nd pereopod longer than merus.....4
   Carpus of 2nd pereopod about as long as or shorter than merus.....10

4(3) Rostrum with a distinct elevated basal crest, generally vary long or with a distinct naked portion in the distal half of the upper margin.....5
   Rostrum without a distinct elevated basal crest.....8

5(4) Tips of telson reaching beyond the tip of the longer posterior spines.....6

Tips of telson overreached by the longer posterior spines; rostrum generally straight; distal part of rostrum without dorsal teeth.....7

6(5) Carpus of the 2nd pereopod in adult male slightly longer half as long as chela; fingers of that leg of the same length as the palm.....*Macrobrachium rosenbergi*

Carpus of the 2nd pereopod in adult male as long as, slightly longer than or slightly shorter than chela; fingers of that leg a little less than half as long as the palm....*Macrobrachium villosimanus*

7(5) Basal crust not much elevated, provided with 5-9 teeth palm of 2nd leg not swollen, fingers shorter than palm.....*Macrobrachium lamarrei*

Basal crest distinctly elevated, provided with 5-9 teeth. In young specimen the 2nd leg has the palm swollen and the fingers longer than the palm. Carpus of 2nd leg in adult male shorter than chela.....*Macrobrachium malcolmsonii*

8(4) Large chela of 2nd leg of adult male with tubeucles at both sides of the cutting edges. Carpus of 2nd leg in adult male shorter than chela. All joints of 2nd leg in adult male pubescent.....*Macrobrachium rude*

Large chela of 2nd leg of adult male without tubercles at each side of the cutting edges.....9

9(8) Rostrum with 9-11 teeth dorsally, 3 of which generally placed behind the orbit. Carpus of 2nd leg in adult male larger than chela.....*Macrobrachium idae*

Rostrum curved upwards and lower margin with 5-7 (seldom 4) teeth. Fingers covered with stiff or velvetty hairs on the entire surface or in the proximal part.....*Macrobrachium equidens*

10(3) Fifth legs conspicuously (about 4/3) longer than the 4th ; rostrum short and high with many dorsal teeth. Second legs of adult male smooth.....*Macrobrachium mirabile*

Fifth legs of about the same lengh as the fourth.....11

11(10) Fingers of 2nd legs of adult male with 1 or 2 fairly large teeth. Smaller teeth may be present between the first tooth and the base of the fingers; anterior tooth of the dactylus placed in or slightly before the middle of the finger.....*Macrobrachium javanicum*

Fingers of 2nd legs of adult male with more than 4 teeth placed at regular intervals, sometimes restricted to the proximal part. Teeth are generally of equal size, but one of the proximal teeth may sometimes be larger. Fingers with a velvetty pubescene in their basal portion. Dorsal teeth of the rostrum beginning in the distal third of the carapace.....*Macrobrachium scabriculum*

Family Sergestidae

Genus Acetes

1. Procurved spine present between 1st pair of pleopods.....2
No procurved spine between 1st pair of pleopods.....3

2(1) Trochanter (basis) of 3rd pereopod with teeth on inner free margin; petasma without membraneous coupling folds.....*Acetes indicus*
Tronchanter (basis) of 3rd pereopod without tooth on inner free margin; petasma with a pair of folded coupling membranes armed with hooks.....*Acetes erythraeus*

3(1) External antenuular flagellum in male with two clasping spines; apex of telson rounded or truncated.....4
External antenuular flagellum in male with single clasping spine; apex of telson triangular.....*Acetes sibogae*

4(3) Segment preceding the one bearing the clasping spines with angular process pointing backwards; apex of telson truncated and with a tooth at each corner.....*Acetes serrulatus*
Segment preceding the one bearing the clasping spines without any process; apex of telson round and third thoracic sternite produced posteriorly as large plate in female.....5

5(4) Ciliated and non-ciliated portions of external border of exopod of uropod not separated by a tooth; distal portion of pars externa without tubercles.....*Acetes japonicus*
Ciliated and non-ciliated portions of external border of exopod of uropod separated by a tooth; distal portion of pars externa without tubercles.....*Acetes cochinensis*

Key to the commercial or potentially commercial species of prawns of the family Penaeidae

1 Post orbital spine present. Subfamily *Solenocerinae*.....4

Post orbital spine absent.....2

2(1) Carapace with a median dentate crest extending nearly or quite to the posterior margin. Subfamily *Sicyoninae*.....8

Carapace without a median dentate crest except occasionally over the eyes.....3

3(2) Distinct median tubercle on occular peduncle; upper antennular flagellum inserted near posterior border of third antennular segment, strikingly shorter than other.....subfamily *Aristaeinae*.....9

No distinct median tubercle on occular peduncle; upper antennular flagellum subequal to the lower one attached to apex of third antennular segment.....subfamily *Penaeinae*.....12

4(1) Antennular flagella foliaceous; post orbital spine absent.....*Solenocera*.....5

Antennular flagella cylindrical or subcylindrical; post orbital spine present.....*Hymenopenaeus*

Rostrum straight; inclined upwards at an angle of 20^0 with 7-8+2 teeth dorsally.....*Hymenopenaeus aequalis* (Bate)

5(4) Telson trifurcate.....6

Telson simple and devoid of any spine on lateral margin.....*Solenocera indica* Nataraj

6(5) Externo distal margin of the exopod of the uropod with spine.....7

Externo distal margin of the exopod of the uropod without spine; post rostral carine not extending beyond cervical groove.....*Solenocera pectinata* (Bate)

7(6) Spine on the cervical groove ventral to the posteriormost spine of the rostral series present; 'L' shaped groove on either branchiostegal region present.....*Solenocera haxtii*

Spine on the cervical groove ventral to the posteriormost spine of the rostral series absent; 'L' shaped groove on either branchiostegal region absent.....*Solenocera choprai* Nataraj

8(2) Post rostral carina armed with 5 teeth; abdominal pleura of 1st and 2nd segments unispinose and 3rd, 4th and 5th with 3 spines.....*Sicyonia Ianoifer* (Olivier)

9(3) Rostrum three-toothed dorsally; hepatic spine absent.....*Aristeus*.....10
Rostrum with many teeth on upper border; hepatic spine present; length of pterygostemian region more than 2.5 times its greatest breadth.....*Aristaeomorpha woodmasoni* Calman

10(9) Integument glabrous.....11
Integument pubescent.....*Aristeus virilis* (Bate)

11(10) Pleurobranchiae on segments X-XIII on distinct filaments provided with pinnules.....*Aristeus semidentatus* (Bate)
Pleurobranchiae on segments X-XIII reduced to mere papillae.....*Aristeus alcocki* Ramadan

12(3) Rostrum without ventral teeth.....13
Rostrum with ventral teeth.....*Penaeus*.....19

13(12) A distal fixed pair of spines on the telson and 1-3 pairs of mobile spines.....14
No distal fixed pair of spines on the telson; lateral mobile spines may be present.....16

14(13) Petasma symmetrical; 3rd maxilliped without basial spine.....15
Petasma asymmetrical; 3rd maxilliped with basial spine.....*Metapenaeopsis*.....26

15(14) Carapace with longitudinal sutures extending from post orbital margin to almost posterior margin.....*Parapenaeus*.....30
Carapace without longitudinal sutures; branchiostegal spine present.....*Penaeopsis*
Telson with 3 pairs of movable marginal spines in addition to the fixed pair .....*Penaeopsis rectacuta* (Bate)

16(13) No exopod on 5th pereopod present; pleurobranch on 7th thoracic somite present .....*Metapenaeus*.....32
Expod on 5th pereopod present; pleurobranch on 7th thoracic somite absent.....17

17(16) Carapace with longitudinal sutures; ischial spine on 2nd pereopod absent.....18
Carapace without longitudinal sutures; ischial spine on 2nd pereopod present.....*Atypopenaeus*
Hepatic spine present; petasma not constricted distally; anterior plate of thelycum rounded posteriorly.....*Atypopenaeus stenodactylus* (Stimpson)

18(17) 3rd pereopod with epipodite.....*Trachypenaeus*.....41
3rd pereopod without epipodite.....*Parapenaeopsis*.....43

Penaeus

19(12) Adrostral carina reaching almost to posterior border of carapace; gastrofrontal carina present 20
Adrostral carina not reaching behind middle of carapace; Gastrofrontal carina absent.....22

20(19) Telson armed usually with 3 pairs of spinules.....21
Telson unarmed; rostrum with 1 ventral tooth.....*Penaeus canaliculatus* Olivier

21(20) Adrostral sulcus narrower than post rostral carina; anterior plate of thelycum rounded at the apex.....*Penaeus japonicus* Bate
Adrostral sulcus as wide as post rostral carina; anterior plate of thelycum bifid at the apex.....*Penaeus laticulatus* Kishinouye

22(19) Hepatic carina present.....23
Hepatic carina absent.....24

23(22) Hepatic carina horizontally straight; 5th pereopod without exopodite .....*Penaeus monodon* Fabricius
Hepatic carina inclined at an angle of 20^0 anteroventrally; 5th pereopod with small exopodite.....*Peneaus semisulcatus* de Haan

24(22) Gastro orbital carina occupying the posterior 2/3 distance between hepatic spine and orbital angle; Rostral crest may be elevated but not triangular in profile ....*Penaeus indicus* Milne Edwards
Gastro orbital carina absent or not reaching hepatic spine and occupying the middle 1/3 distance between hepatic spine and orbital angle.....25

25(24) Dactyl of 3rd mxpd. of adult ♂½ propodus; adrostral carina not reaching as far as epigastric tooth; rostral crest triangular in profile.....*Penaeus merguiensis* de Man

Dactyl of 3rd mxpd. of adult ♂ much longer than propodus; adrostral carina reaching just beyond tooth; rostral crest markedly elevated .....*Penaeus penicillatus* Alcock

Metapenaeopsis

26(14) Stridulating organ present on posterior branchiostegite.....27

Stridulating organ absent from posterior branchiostegite.....28

27(26) Dorsal carina of 3rd pleonic somite sulcate; stridulating organ almost straight; anterior edge of thelycal plate entire, left petasmal lobe sharply pointed and triangular .....*Metapenaeopsis stridulans* Alcock

28(26) A pair of tooth-like platelets behind thelycal plate, posterior tubercles lacking .....*Metapenaeopsis mogiensis* (Rathbun)

No teeth like platelets immediately posterior to thelycal plate.....29

29(28) Posterior extension of thelycal plate with indistinct median sulcus and angular posterolateral corners.....*Metapenaeopsis andamanensis* (Wood-Mason & Alcock)

Posterior extension of thelycal plate with distinct median sulcus and evenly rounded posterolateral corners.....*Metapenaeopsis philippii* (Bate)

Parapenaeus

30(15) Branchiostegal spine present; 5th pereopods not reaching tip of antennal scale.....31

Branchiostegal spine absent; 5th pereopods exceeding antennal scale by dactyl .....*Parapenaeus longipes* Alcock

31(30) Branchiostegal spine on anterior margin of carpace; 6th abdominal somite less than twice length of 5th; process ‘a’ of petasma bifurcate, directed laterally; thelycum with anterior, intermediate and posterior plates.....*Parapenaeus fissurus* (Bate)

Branchiostegal spine a little behind anterior margin of carapace; 6th abdominal somite more than twice length of 5th; rostrum reaching distal end of 1st segment of antennular peduncle.....*Parapenaeus investigatoris* Alcock

Metapenaeus

32(16) Distomedian petasmal projection with fully developed or vestigial apical filament; thelycum of impregnated females usually with white conjoined pads.....33

Distomedian petasmal projection without apical filament; thelycum of impregnated females without white conjoined pads.....35

33(32) Rostrum wide and short, not reaching to distal end of basal antennular segment; thelycum with ovoid anterior and lateral plates of subequal size; conjoined pads usually set askew; apical filaments of petasma vestigial represented by a pair of rounded bosses.....
.....*Metapenaeus lysianassa* (de Man)

Rostrum projecting beyond basal antennular segment, with a marked edentate distal portion..34

34(33) Posterior part of rostrum with distinctly elevated crest; basial spine on ..3rd pereopod simple; apical petasmal filaments slender slightly converging; thelycum with a large anterior and small lateral plates.....*Metapenaeus brevicornis* (Milne Edw.)

Posterior part of rostrum without distinctly elevated crest; basial spine on ..3rd pereopod long and barbed; apical petasmal filaments not readily visible; anterior plate tongue like .....*Metapenaeus dobsoni* (Miers)

35(32) Branchiocardiac sulcus distinct in at least posterior 1/3 carapace; distomedian petasmal projections flap-like.....36

Branchiocardiac sulcus almost completely absent; distomedian petasmal projections anteriorly filiform each with a serrate ventral margin.....*Metapenaeus stebbingi* (Nobili)

36(35) Ischial spine on 1st pereopod distinct.....37

Ischial spine on 1st pereopod small or absent.....40

37(36) Distomedian petasmal projections directed anteriorad; lateral thelycal plates with raised lateral ridges, each with a posterior inwardly curved triangular plate.....*Metapenaeus ensis* (de Haan)
Distomedian petasmal projections directed anterolaterally; anterior thelycal plate tongue-like 38

38(37) Lateral thelycal plates with salient and parallel earshaped lateral ridges; distomedian petasmal projections hood-like.....*Metapenaeus monoceros* (Fabricius)
Lateral thelycal plates without lateral raised ridges; distomedian petasmal projectios not hood-like.....39

39(38) Posterior extension of the anterior median thelycal plate bound laterally by an oval flat plate on each side; distomedian petasmal projections overlying lateral projections and distally trilobed .....*Metapenaeus alcocki* George & Rao
Posterior extension of the anterior median thelycal plate not bound laterally by oval plate on either side; distomedian petasmal projections not overlying lateral projections .....*Metapenaeus kutchensis* George, George and Rao

40(36) Branchiocardiac carina distinct, extending from posterior margin of carapace almost to hepatic spine; anterior thelycal plate longitudinally grooved, wider posterirly than anteriorly; distomedian petasmal projections crescent shaped.....*Metapenaeus affinis* (Milne Edw.)
Branchiocardiac carina feeble or ill-defined, anterior end not exceeding posterior 1/3 of carapace; distal margin of anterior thelycal plate convex to indistinctly triangular; petasma with laminose and strongly diverging distomedian projections.....*Metapenaeus burkenroadi* Kubo

Trachypenaeus

41(18) Epipodites present on 1st and 2nd pereopods.....42
Epipodites absent on 1st and 2nd pereopods; distolateral projections of petasma with sharp tips reaching coxae of 4th pereopods; anteolaterally with large wing-like flaps on outer curvature .....*Trachypenaeus pescadoreensis* Schmitt

42(41) The plates of thelycum with raised anterior and lateral margins.....*Trachypenaeus sedili* Hall

The anterior plate of the thelycum may have a raised anterior margin but laterally the margine are not raised; an excavation present between the anterior plate and the transverse sternal ridge .....*Trachypenaeus curvirostris* (Stimpson).

Parapenaeopsis

43(18) Epipodites present on 1st and 2nd pereopods.....44

Epipodites absent on 1st and 2nd pereopods.....49

44(43) 2nd pereopods with basial spines.....45

2nd pereopods without basial spines.....*Parapenaeopsis uncta* (Alcock)

45(44) Telson with pair of fixed subapical spines; at least distal $\frac{1}{2}$ free portion of rostrum unarmed .....*Parapenaeopsis stylifera* (Milne Edw.)

Telson without fixed subapical spines; with or without lateral movable spines; 1/3 or less free portion of rostrum unarmed.....46

46(45) Petasma with a pair of distolateral projections directed laterally or distolaterally, usually short and spout-like.....47

Petasma with pair of long slender caliper-like distolateral projections directed forwards; thelycum with median tuft of long setae behind posterior edge of last thoracic sternite; third pereopod of ♀ with basial spine.....*Parapenaeopsis cornuta maxillipido* (Alcock)

47(46) Postrostral carina reaching almost to posterior border of carapace; petasma with pair of short spout-like distolateral projections and pair of cap-like distal projections.....48

Postrostral carina reaching 3/4 carapace; petasma with pair of distolateral projections directed laterally, cap like distal projections absent .....*Parapenaeopsis nana* (Alcock)

48(47) Antennular flagella 0.5-0.6 length of carapace; thelycum with median tuft of setae on posterior plate.....*Parapenaeopsis sculptilis* (Heller)

Antennular flagella of 0.7 length of carapace or longer; thelycum with out a median of tuft off setae on posterior plate.....*Parapenaeopsis hardwickii* (Miers)

49(43) Anterior plate of thelycum with V shaped posterior edge; and 2 accessory ridges on anterior edge of posterior plate; rostrum with proximal 1/3 rising from carapace; remainder more or less horizontal.....*Parapenaeopsis tenella* (Bate)

Anterior plate of thelycum with a more or less straight transverse posterior edge; no accessory ridges on anterior edge of posterior plate; rostrum upwards at an angle to carapace for whole of its length.....*Parapenaeopsis acclivirostris* (Alcock)

Family *Penaeidae* Rafinesque

Among the penaeid prawns there are about 48 species belonging to different subfamilies and genera found in the coastal waters of India. Excepting for a few forms both form the deeper waters as well as coastal inshore waters, most of these are of commercial importance at some part of the coast or other. Details regarding their systematic position and distribution are as follows : -

Subfamily *Solenocerinae* Wood-Mason & Alcock 1891

Solenocera Lucas 1850

Solenocera indica Nataraj 1945

Solenocera kuboi Hall, 1956: 69-71

Solenocera subnuda kubo, 1949 : 255-260, Cheung 1959: 224; Cheung 1960: 68; 1963 : 401-433; Hall 1962: 11-12; de Bruin, 1965: 74.

Solenocera indicus Nataraj 1945: 94; Ahamed 1957

Solenocera indica Kunju 1967: 1-12.

The species has a distribution in the Indo-Pacific from East Pakistan waters, along Indian coasts and Ceylon to Malaysia, Borneo and Hong Kong. In Indian waters it is found along both west and east coasts. On the west coast in Bombay waters the species contributes to a fishery (Kunju, 1967). While most of the species of Solenocerinae are deep water forms, *S. indica* is a littoral species inhabiting waters of 40 m and less.

Solenocera pectinata (Bate, 1888)

Philonicus pectinatus Bate 1888: 279.

Philonicus cervicalis Zehnter 1894 : 210

Solenocera pectinata de Man 1911: 45-47; Anderson and Lindner 1943: 286 (in Key)Nataraj 1945: 96; Hall 1961: 80; 1962: 13; 1966: 98; George 1967: 337.

Solenocera pectinulata Kubo 1949: 251-255.

This has been recorded from Arafura Sea, Flores Sea, Ceram Sea, off Owase, Japan, Arabian Sea, Tenasserem Coast, Burma and South China Sea. In Indian waters the species has been obtained in trawl nets operated in Arabian Sea off south west coast in depths from 25-60 fathoms. It is recorded in small numbers and at present does not contribute to any fishery. Size also is too small to be of any commercial significance.

Solenocera hextii Wood-Mason 1891

Solenocera hextii Wood-Mason 1891: 275; Alcock 1901: 20-21; de Man 1911: 7; Ramadan 1938: 56; Anderson and Linder 1943 : 286; (in Key); George 1967: 338.

The species has a general geographic distribution in the northern Indian Ocean regions. On the Indian coast it has a distribution along the entire west coast and also in the Bay of Bengal. It is a fairly deep water form recorded from 65 to 276 fathoms. The recent exploratory trawling operations off the south west coast of India in 150 to 200 fathoms areas caught this species in varying numbers; but never in very large quantities. The larger size of the species is particularly attractive to commerce.

Solenocera choprai Nataraj 1945

Solenocera choprai Nataraj 1945: 91.

This is a species which has been recorded so far only from the type locality which is Arabian Sea ($17^0$27'N, 71^0 41' E) from depths of 56 to 58 fathoms.

Solenocera koelbeli de Man 1884

Solenocera distncta koelbel 1884 : 314; Balss 1914: 5-6
Solenocera koeobeli de Man 1911: 48; Anderson and Lindner 1943: 286 (in Key); George 1967 : 338.

Outside the type locality of the species in Japan, this is only recorded from the Arabian Sea off south west coast of India and that in very small numbers. Depth from which the species is recorded in India is from 35-40 fathoms.

Solenocera melantho de Man 1907

Solenocera melantho de Man 1907: 137; 1911: 48-52; Hall 1961: 78-79; 1962: 12; Ganapathi & Subramanyam 1966: 12.
Solenocera depressa Kubo 1949: 237-240.

Having a distribution in the East Indian Archipelago, Malaysia and Japan, the species has been recently reported from the east coast of India near the Godavari estuarine system in comparatively shallow waters. Here it is found in small numbers along with commercially important penaeids.

Hymenopenaeus aoqualis (Bate 1888)

Haliporus equalis Bate 1888 : 285-286
Haliporus aequlais de Man 1911: 32-33
Hymenopenaeus aequalis Kubo 1949: 219-222 (with synonym); George 1967: 339.

The species has a fairly wide distribution in the Indo-Pacific, extending from the east coast of Africa along the Indian seas to Japan. In Indian waters it is found on the west coast off south west and also on the east coast in Andaman Sea. All the records are from above 150 fathoms.

Sicyoninae

Sicyonia lancifer (Olivier 1811)

Sicyonia lancifer de Man 1911: 123-124 (with synonymy); Hall 1961: 112; 1962: 37; George 1967: 344.
Eusicyonia lancifer Kubo 1949: 439-444; Kurian 1953: 761.

This species is distributed in Japan, Penang, the pearl banks of

Gulf of Mannar, Ceylon and south west coast of India. From the Arabian Sea it is reported in very small numbers from 12-17 fathoms depth.

Aristaeinae

Aristeus semidentatus (Bate 1888)

Hemipenaeus semidentatus Bate 1888: 305.
Aristeus semidentatus de Man 1911: 29-31; Ramadan 1938: 40; George 1967: 339-340 (with synonymy).

Till recently the species was known only from the areas near Kermadec Islands and Kei Islands. The recent exploratory shrimp trawling operations in deeper waters (150-200 fathoms) off Cochin and Alleppey on the south west coast of India caught this species among others in fairly large numbers from certain areas in that zone. This is the largest among the prawns caught in these operations and is of great potential importance commercially.

Aristeus alcocki Ramadan 1938

Aristeus semidentatus Alcock 1901: 31; Kemp and Sewell 1912: 19.
Aristeus alcocki Ramadan 1938: 40-42; George 1967: 340.

Gulf of Aden, Bay of Bengal and Arabian Sea near the Laccadives and Cape Comorin are the three localities from which the species is recorded. Unlike the previous species this is found in small numbers in the recent exploratory trawl catches off south west coast of India.

Aristeus virilis (Bate 1881)

Hemipenaeus virilis Bate 1881: 187; 1888: 303.
Hemipenaeus tomentosus Bate 1881: 189; 1888: 307.
Aristeus virilis Wood-Mason 1891: 279; Alcock 1901: 30; Bouvier 1908: 70; Kubo 1949: 194-200.
Aristeus virilis de Man 1911: 27-29; Ramadan 1938: 39-40.

General distribution of the species in the Indo-Pacific extends from the Andaman Sea through the East Indian Archipelago to Japan. In the Andaman sea it is found in depths of 188 to 405 fathoms.

Aristaeomorpha woodmasoni Calman 1925

Aristeomorpha woodmasoni Calman 1925: 8 (with synonymy); Burkenroad 1936: 85; Ramadan 1938: 53
Aristaeomorpha rostridentata kubo 1949: 206.
Aristaeomorpha woodmasoni Barnard 1950: 627.

Apart from Indian waters Bay of Bengal, Andaman Sea and Arabian Sea the species is recorded only from South East Australia. In Indian waters the depth from which it is recorded ranges from 180 to 271 fathoms.

Penaeinae

Penaeus canaliculatus Olivier 1811

Penaeus canaliculatus Olivier 1811: 660; Milne Edwards 1837: 414; Bate 1881: 174; and 1888: 243; Nobili 1906: 9; de Man 1911: 106-107; Barnard 1950: 590; de Bruin 1965: 75; Joubert 1965: 18-20; Hall 1966: 98.

Peneus canaliculatus of Alcock (1906) being later synonymised as *P. japonicus* Bate, most of the records of *P. canaliculatus* from Indian waters may be referred to *P. japonicus*. However *P. canaliculatus* auct. has recently been obtained in few numbers among the prawn collections from south west coast of India, although it does not contribute to a fishery. General distribution of the species is South Africa, Mauritius and Red Sea through Indian Seas to East Indies and Fiji Islands. The maximum size attained by the species is about 150 mm.

Penaeus japonicus Bate 1888

Penaeus canaliculatus var japonicus Bate 1888: 245-248.
Penaeus canaliculatus Ortmann 1890: 488; Kishinouye 1990: 11-12; Rathbun 1902: 37; Nataraj 1942: 468; Menon 1956: 345 (key).

Penaeus canaliculatus Alcock 1906: 14-16 (part synonymy only).
Penaeus japonicus Nobili 1906: 10; de Man 1911: 107; Balss 1914: 13; Kubo 1949: 273-278; Barnard 1950: 590-692; Hall 1956: 71; 1962: 14; 1966: 98; Ahmed 1957; Dall 1957: 142 (in key); Racek and Dall 1965:12; Cheng-Ming 1965: 2; Joubert 1965: 15-16; Ganapathi and Subramanyam 1966: 12; Tirmizi 1967: 5.

This is widely distributed throughout the greater part of the Indo-West-Pacific, from Africa to Fiji. In Indian waters it makes a small contribution to the fishery along the Madras coast especially in Pulicat

Lake and on the west coast occurs in small numbers in Bombay and other places, Maximum size up to 27 cm in length. On the east coast it occurs in the fishery in the post-monsoon months.

Penaeus latisulcatus Kishinouye 1900

Penaeus latisulcatus Kishinouye 1900: 12; de Man 1911: 108-11; Kubo 1949: 278-82; Racek 1955: 222-23; Hall 1956: 72; 1962: 14-15; 1966: 98; Dall 1957: 149-151; Racek and Dall 1965: 12-13; de Bruin : 1965: 75-75; Cheng-Ming 1965: 3; Joubert 1965: 17-18.

Penaeus latisulcatus Schmitt 1926: 365-67.

Penaeus canaliculatus var. *australiensis* de Man 1902: 905.

Scattered distribution from Red Sea through Malaysia and the Molluccas ot Korea and Japan. So far the species was not reported from Indian waters. One or two specimens were obtained recently from the south west coast collection and it is now reported for the first time from India.

Penaeus monodon Fabricius 1798

Penaeus monodon Fabricius 1798: 408; Haswell 1882: 199; Kishinouye 1900: 7&15; Stebbing 1910: 380; Holthuis 1949: 1051-57; Kubo 1949: 291(part synonymy only); Barnard 1950: 584; Dall 1957: 152-154; Racek and Dall 1965: 10-11; de Bruin 1965: 76; Cheng-Ming 1965: 1; Joubert 1965: 22-24; Hall 1966: 98; Tirmizi 1967: 7.

Penaeus carinatus Dana 1852: 602; de Man 1911: 101; Kemp 1915: 317; Burkenroad 1934: 74; Nataraj 1942: 468; Anderson and Lindner 1943: 305; Racek 1955: 215-17; Menon 1956: 345 (Key).

Penaeus semisulcatus Alcock 1906: 10-11.

Penaeus caeruleus Stebbing 1905: 77; Burkenroad 1934: 74; Racek 1955: 217-218.

Penaeus caeruleus Schmitt 1926: 359 & 363.

Penaeus bubulus Kubo 1949: 296-301.

This is one of the penaeid species which is widely distributed throughout the greater part of the Indo-West-Pacific region ranging from South Africa to southern Japan apparently preferring warm water habitats. Along the Indian coast it is more common on the east coast especially in the northern section (Bengal and Orissa) where it contributes to a fishery. On the west coast of India although not forming a dominant fishery anywhere large sizes are caught in good numbers mostly in the northern section.

This is the largest Indian marine prawn attaining a maximum of 300-320 mm in length. As in other commecially important penaeid prawns breeding takes place in the sea and the juveniles enter estuaries, backwaters and lakes.

Penaeus semisulcatus de Haan 1850

Penaeus semisulcatus de Haan 1850: 191; de Man 1911: 97-100; Barnard 1950: 588; Racek 1955: 218-19; Ahamed 1957: Dall 1957: 154-57; Racek and Dall 1965: 11; Joubert 1965: 20-22; de Bruin 1965: 76; Hall 1966: 98; Tirmizi 1967: 7.

Penaeus monodon Bate 1888: 250; Kubo 1959: 291-296; (part synonymy only); Menon 1956: 345 (Key).

Penaeus ashiaka Kishinouye 1900: 7-14; Rathbun 1902: 38; Nobili 1903: 2 and 1906: 16.
Penaeus monodon Alcock 1906: 8.
Penaeus semisulcatus Schmitt 1926: 360&364.

Widely distributed in the tropical Indo-West-Pacific ranging from Durben Bay through Red Sea, Indian waters, Malaysia, Indonesia to northern and north eastern Australia through New Guinea, Philippine Islands to southern Japan, apparently preferring tropical habitats. On the Indian coast this is more common on the east coast. It grows to a size of 230-250 mm.

Penaeus indicus H. Milne Edwards 1837

Penaeus indicus H. Milne Edwards 1837: 415; Dana 1852: 604; Heller 1865: 122; Miers 1878: 301; Bate 1888: 248; Lanchester 1900: 471; Nataraj 1942: 468; Kubo 1949: 311-315; Barnard 1950: 588-90; Racek 1955: 220-21; Menon 1956: 346(Key); Hall 1956: 75; 1962: 16; 1966: 98; Ahamed 1957: Dall 1957: 162; Cheung 1960: 67-68; Racek & Dall 1965: 15-16; Crosnier 1965: de Bruin 1965: 76; Cheng-Ming 1965: 4; Joubert: 1965:24-26; Tirmizi 1967: 8.
Penaeus indicus var. *longirostris* de Man 1892: 511.
Penaeus indicus Alcock 1906: 12; Schmitt 1926: 361.
Penaeus semisulcatus Stebbing 1915: 69.

General distribution ranging from the coasts of India and Ceylon to the west through the Gulf of Aden to Madagaskcar and east coast of Africa, and to the east through Malaysia and Indonesia to Philippines, New Guinea and northern Australia. Due to the availability of the species

in India in all the coastal waters, estuarines and backwaters and also the large size attained, namely 200-230 mm in length, this is one of the most important commercial species here. Breeding takes place in the sea and the young ones migrate to the backwaters and estuaries, where there is a fishery for the small sizes upto 120-140 mm in length.

Penaeus merguiensis de Man 1888

Penaeus merguiensis de Man 1888: 287-90; 1911: 104-105; Kubo 1949: 308-11; Racek 1955: 221-22; Hall 1956: 74-75; 1962: 15; Dall 1957: 160-62; Cheung 1960: 67; de Bruin 1965: 76; Racek and Dall 1965: 16-17; Tirmizi 1967: 8; Kirkegaard, Tuma & Walker 1967.

Penaeus indicus Bate 1888: 248.

Penaeus indicus var *merguiensis* de Man 1892: 511; Menon 1956: 346(Key).

Penaeus merguiensis Schmitt 1926: 360-61; Boone 1935: 96-101.

Penaeus indcus var. *merguiensis* Alcock 1906: 13.

Widely distributed in tropical waters from west Pakistan eastward to New Caledonia, penetrating the Australian region southward. On the Indian coasts the species contributes to a fishery only in the middle regions of both east and west coast. In other areas it is found in very small numbers. In the regions where the species contributes to a fishery juveniles are fished from estuaries. It grows to a maximum size of about 240 mm in length.

Penaeus penicillatus Alcock 1905

Penaeus indicus var. *penicillatus* Alcock 1905: 525; 1906: 13; Ahamed 1957

Penaeus indicus var. *penicillatus* Menon 1956: 346(Key).

Penaeus pencillatus Kubo 1949: 306-08; Hall 1956: 73-74; 1962: 15; Cheung 1960: 66-67; Tirmizi 1967: 8.

Peneus penicillatus Schmitt 1926: 361.

The distribution of the speicies extends from Karachi coast in West Pakistan through Malaysian waters to Taiwan. In the Indian region it is found in the fishery of the coastal waters north to Bombay. It is also recorded from Orissa coast. Grows to a maximum length of 210 mm.

Metapenaeopsis stridulans (Alcock 1905)

Metapeneus stridulans Alcock 1905: 526; 1906: 27-29 (not synonymy, nor figure 14b plate 5).
Metapenaeopsis stridulans Nataraj 1942: 468; Hall 1961: 105-09; 1962: 32; 1966: 99; de Bruin 1965: 84-85; Racek & Dall 1965: 32-34.
Metapenaeopsis novae-guineae Kunju 1960: 83.

General distribution in Indian Seas and Ceylon through Malaysian waters to eastern New Guinea. In Indian waters it is found in the Bombay region as well as the northern region of east coast. The species is noticed to be represented in the "dol" net catches of Bombay in fairly large numbers particularly in the months October and November. Recorded from 5 to 30 fathoms depth. Maximum size attained is about 100 mm in length.

Metapenaeopsis mogiensis (Rathbun 1902)

Parapenaeus mogiensis Rathbun 1902 :39.
Metapeneus mogiensis Alcock 1906: 29-30.
Penaeopsis mogiensis Schmitt 1926: 346-48.
Metapenaeopsis mogiensis Nataraj 1942: 468; Dall 1957: 772-74 (part synonymy); Cheung 1960: 63; Racek & Dall 1965: 42-44 (part synonymy only); de Bruin 1965: 84.

The species has a distribution from Indian waters to South China Sea and Japan in the north east and tropical Queensland in the south east. In the Indian region it is found off the Malabar coast, Ceylon and Andaman Islands. Maximum size attained is about 90 mm in length.

Metapenaeopsis andamanensis (Wood-Mason 1891)

Metapenaeus philippinensis var. *andamanensis* Wood-Mason 1891: 271; Wood-Mason & Alcock 1891: 186-202.
Penaeus (*Metapenaeus*) *coniger* var. *andamanensis* Alcock 1901: 17.
Metapeneus coniger var. *andamanensis* Alcock 1906: 27.
Penaeopsis coniger var. *andamanensis* de Man 1911: 61-62.
Metapenaeopsis coniger Kubo 1949: 432-34.
Metapenaeopsis andamanensis Hall 1961: 109-110; 1962: 99; Racek & Dall 1965: 20 (in Key); George 1967: 343.

Distributed from the Indian Seas through Malaysian waters to Kei Islands and Japan. In Indian Seas it is found in the deeper waters off the south west coast and also in the Andaman Sea. Recent exploratory cruises of the Indo-Norwegian Project vessels off the south west coast of India in waters of depth from 150 to 200 fathoms have caught the species in fairly good numbers in trawl net operations suggesting commercial possibilities of exploitation of the species. Grows to maximum length of 135 mm.

Metapenaeopsis philippii (Bate 1881)

Penaeus philippinensis Bate 1881: 181; 1888: 261.
Penaeopsis philippii Calman 1923: 536; 1925: 12; Ramadan 1938: 70; Barnard 1950: 592-93; John & Kurien 1959: 156-59.
Metapenaeopsis philippii Dall 1957: 168 (in Key); Racek and Dall 1965: 20 (in Key); Hall 1966: 99.

General distribution from Zanzibar through Indian Seas to Philippine Islands. This is also a deepwater form found in the catches of the recent deepwater trawling operations off south west coast of India. John & Kurien (1959) caught the species from the area and pointed out the possibility of commercial exploitation. Maximum size is about 130 mm.

Parapenaeus longiceps Alcock 1905

Parapeneus longipes Alcock 1905: 525; 1906: 33.
Parapenaeus longipes de Man 1911: 81-82; kubo 1951: 259-263; Cheung 1960: 65; Racek & Dall 1965: 52-53; de Bruin 1965: 99-100; George 1967: 341-42.

The species has a general distribution from east Africa through Indian and Indonesian waters to New Guinea and Japan. It is recorded in Indian waters along the south west coast off Mangalore and Cochin and on the east coast off Ganjam coast, Vizagapatnam and off the mouth of river Hooghly. Maximum size about 80 mm.

Parapenaeus fissurus (Bate 1888)

Penaeus fissurus Bate 1888: 263-66.
Parapeneus fissurus Alcock 1905: 520; 1906: 31-32.

Parapenaeus fissurus de Man 1911: 79-80; 1922: 9; Balss 1914: 10-11; 1925: 44; Stebbing 1914: 19-20; Ramadan 1938: 73; Kubo 1949: 400-403; Barnard 1950: 601-02; Dall 1957: 179 (Key); Cheung 1960: 65; Hall 1961: 104; 1962: 30; 1966: 99; Racek & Dall 1965: 53-54.

The distribution is very similar to that of *P. longipes*, extending from East Africa through Indian Seas, Malaysia and Indonesian waters to Philippines, South China Sea and Japan. In India it is recorded only from the east coast off Ganjam and also from the Andamans. Females attain a maximum length of 120 mm.

Parapenaeus investigatoris Alcock & Anderson 1899

Parapeneus investigatoris Alcock & Anderson 1899: 279; Alcock 1906: 32.
Peneus (*Parapeneus*) *investigatoris* Alcock 1901: 18.
Parapenaeus investigatoris de Man 1911: 80; Ramadan 1938: 73; Kubo 1949: 406-408; Barnard 1947: 382; 1950: 602-04; Dall 1957: 179 (Key); Hall 1966: 99; George 1967: 341.

Distributed from East Africa through Indian waters and Indonesian waters to Japan. In Indian waters the species is mostly recorded from Gulf of Mannar and off Pulicat Lake on the east coast and also from the Andaman Sea. It has been recently obtained from the Arabian Sea off Cochin in the deep water trawling operations. Maximum size attained about 80 mm in females.

Penaeopsis rectacuta (Bate 1888)

Penaeus rectacutus Bate 1888: 266.
Metapenaeus rectacutus Wood-Mason 1891: 274; Alcock & Anderson 1894: 145.
Peneus (*Parapeneus*) *rectacutus* Alcock 1901: 17.
Parapenaeus rectacutus de Man 1911: 82-83; Balss 1925: 228; Yokoya 1933: 9.
Penaeopsis (*Penaeopsis*) *rectacutus* Burknroad 1934: 5, 8 & 13.
Penaeopsis rectacutus Kubo 1949: 322-26.
Penaeopsis rectacutus Ramadan 1938: 67-68; Kurien 1964: 216.
Penaeopsis rectacuta Hall 1962: 18; George 1967: 342.

Distributed from Gulf of Aden through Indian and Malaysian waters to Philippine Islands, South China Sea and Japan. On the Indian coasts it has been recorded in smaller numbers off Madras and also in Andaman

Islands. Recent exploratory trawling operations in deeper waters of 150 to 200 fathom depths off Kerala coasts has caught this prawn in appreciable quantities indicating possibility of commercial exploitation. Maximum size reached by females is 130 mm in length.

Metapenaeus Iysianassa (de Man 1888)

Penaeus Iysianassa de Man 1888: 290-95.
Metapeneus Iysianassa Alcock 1906: 23-24.
Metapenaeus Iysianassa Burkenroad 1934: 36; Kubo 1949: 359-61; Hall 1956: 82-83; 1962: 24; Ahamed 1957; Dall 1957: 183 (Key); Racek and Dall 1965: 79-80; de Bruin 1965: 81.

The species has a general distribution from Indian waters and Ceylon to North Borneo. The Indian records are mostly from the east coast off river Hooghly, Orissa coast and Gulf of Mannar. On the west coast it is rarely found on the south west region. Females reach maximum of 90 mm length.

Metapenaeus brevicornis (H. Milne Edwards, 1837)

Penaeus brevicornis H. Milne Edwards 1837: 417; Bate 1881: 180; Handerson 1983: 450; de Man 1897: 681; Lanchester 1901: 571.
Metapeneus brevicornis Alcock 1906: 22-23.
Penaeopsis brevicornis Kemp 1918: 294-295.
Metapenaeus brevicornis Burkenroad 1934: 33-36; Kubo 1949: 351-55; Hall 1956: 81; 1962: 24-25; Menon 1956: 346 (Key); Ahmed 1957; Dall 1957: 184 (Key); Racek & Dall 1965: 81-82; George 1967(in press).
Penaeus avirostris Dana 1852: 603; Heller 1865: 123; Miers 1880: 457.
Penaeopsis avirostris Balss 1914: 10.
Metapenaeus avirostris Nobili 1903: 2.
Penaeus sp. Lanchester 1901: 571-72.

General distribution of the species is West Pakistan through Indian, Malaysian, Thai and Indonesian waters to about East Borneo. In the distribution of the species in Indian waters the peculiarity noticed is that unlike other allied species this does not occur in the southern areas while contributing to good fishery in the northern region both on the west as well as east coasts. In these areas it is represented well in the estuaries also, juveniles contributing to a fishery there. Maximum size attained is up to 125 mm.

Metapenaeus dobsoni (Miers 1878)

Penaeus dobsoni Miers 1878: 302.
Metapenaeus dobsoni Nobili 1903: 3; Nataraj 1942: 468; Menon 1956: 346 (Key); Dall 1957: 183 (Key); Hall 1962: 25; Racek & Dall 1965: 80-81; de Bruin 1965: 80; George 1967 (in press).
Metapeneus dobsoni Alcock 1906: 21-22.
Penaeopsis sp. de Man 1911: 60-61.
Penaeopsis dobsoni Kemp 1915: 322; Panikkar 1937: 345.

Distribution is Indian waters through Malaysia and Indonesia to Philippine Islands. The species is both marine and brackishwater form. This is one of the most important commercially exploited species in Indian waters. It is more common along the south west coast where it contributed to a major fishery. The adults are fished from the inshore areas up to about 40 m depth and the juveniles are fished from most of the estuaries and backwaters where it enters at late larval and postlarval stages after hatching out in the sea.

The species rarely exceeds 125 mm in length. The maximum size attained in the estuarine environment is 70 to 75 mm.

Metapenaeus stebbingi (Nobili 1904)

Metapenaeus stebbingi Nobili 1904: 229; 1906: 15; Burkenroad 1934: 33; Barnard 1947: 382; Barnard 1950: 599-600; Tirmizi 1962: 103-106; 1967: 90; Ramamurthy 1964: 170; Racek & Dall 1965: 57(Key); Joubert 1965: 27; Hall 1966: 99.
Penaeopsis stebbingi Tattersall 1921: 365; Monod 1930: 140.

The distribution is apparently restricted to eatern Indian Ocean region, from western South Africa through Suez, Red Sea to West Pakistan and north west coast of India. From India it is recently recorded from the Gulf of Kutch region. Maximum size up to 120 mm length.

Metapenaeus ensis (de Haan 1850)

Penaeus monoceros ensis de Haan 1850: 192.
Penaeus monoceros Haswell 1882: 200.
Penaeus mastersii Haswell 1879: 42; 1882: 203.
Penaeus incipes Bate 1888: 257-58 (not including female); Kishinouye 1900: 18-19; Blanco and Arriola 1937: 223.

Penaeopsis monoceros de Man 1911: 55-57; Schmitt 1926: 325-29 (including part of "*Penaeus mastersii*").

Metapenaeus incisipes Alcock 1906: 51.

Metapeneus ensis Alcock 1906: 24-25.

Metapenaeus monoceros Kubo 1949: 329-33 (part synonymy only); Hall 1956: 77-78 (not including Fig. 11); Dall 1957: 184-87 (part synonymy only).

Metapenaeus incisipes Racek 1955: 230-32; 1959: 10.

Metapenaeus ensis Hall 1958: 537-44; 1962: 22-23; Racek and Dall 1965: 58-61; de Bruin 1965: 80; Muthu 1965: 465; Cheung 1960: 66-68.

(Non *Metapenaeus mastersii* Racek 1955, 1957, 1959; Dall 1956, 1957, 1958 and Hall 1962).

Distribution from Indian waters through Malacca strait and Indonesian waters to New Guinea, ranging north along South East China to Japan and South to western Australia, Queensland and New South Wales. Hall (1962) considered Malacca Strait as the western boundary for the distribution of this species. But recently it has been recorded from the Bay of Bengal (Muthu 1965) as well as Ceylon waters (de Bruin 1965). In Indian waters so far it is recorded only from the east coast off Waltair and slightly south.

Maximum size attained is about 170 mm in length.

Metapenaeus monoceros (Fabricius 1798)

Penaeus monoceros Fabricius 1798: 409; Milne Edwards 1837: 415; Dana 1852: 605; Stimpson 1860: 44 (part) Miers 1878: 301; Bate 1881: 177; Ortmann 1890: 450 (part); Thalwitz 1890-91: 2; de Man 1892: 513; 1898: 680; Deflein 1902: 631.

Metapenaeus monoceros Alcock 1906: 18-20;

Penaeopsis monoceros Kemp 1915: 321; Calman 1925: 12; Monod 1930: 140; Panikkar 1937.

Penaeopsis spinulicauda Stebbing 1914: 17; 1917: 444.

Metapenaeus monoceros Nobili 1903: 3; Burkenroad 1934: 32-33; Nataraj 1942: 468; Barnard 1950: 597-99; Menon 1956: 346 (Key); Ahmed 1957: 9; Hall 1958: 543; Racek and Dall 1965: 57 (in Key); de Bruin 1965: 79-80; Joubert 1965: 27-29; Hall 1966: 98; George 1967 (in press).

General distribution of the species is South Africa through Mediterranean and Indian Seas to Malaysia. According to Hall (1962) its eastern limit of distribution is Malacca Strait. It is one of the

hardiest prawns and used in several physiological experiments in the Indian region. It occurs along the entire coastline, found in juvenile stages in the estuaries and backwaters and adults in the sea up to 50-60 m depths. Larger sizes are mostly caught only from deeper areas. Females attain a maximum size of 180 mm in length.

Metapenaeus alcocki George & Rao 1966.

Metapenaeus alcocki George and Rao 1966: 146-151.

This is a species which has been recently described for the first time from the Gulf of Kutch area and it has not been obtained later out of the type locality. Maximum length of specimens obtained from the type locality is 97 mm.

Metapenaeus kutchensis George, George & Rao

Metapenaeus kutchensis George, George & Rao 1963: 284-288.

A species which is recorded from Indian waters only so far. It was described recently from the Gulf of Kutch area where it is found to contribute to a fishery. Maximum size attained so far is about 130 or 140 mm in length.

Metapenaeus affinis (H. Milne Edwards, 1837)

Penaeus affinis H. Milne Edwards 1837: 416.
Metapenaeus affinis Alcock 1906: 20-21.
Penaeopsis affinis Kemp 1915: 321; de Man 1924: 4-5 (non 1911); Panikkar 1937: 345.
Metapenaeus affinis Burkenroad 1934: 29-32; Kubo 1954: 82-92 (non 1949); Menon 1956: 346 (Key); Cheung 1960: 66; Racek and Dall 1965: 68-69; Tirmizi 1967:11; George 1967 (in press).
Penaeus mutatus Lanchester 1901: 572-73.
Metapenaeus necopinans Hall 1956: 82-84.
Metapenaeus mutatus Hall 1961: 86-87; 1962: 25; de Bruin 1965: 76-78.

General distribution of the species is Indian Seas through Malaysia and part of Indonesia to Hongkong and Japan. This is a medium size prawn commercially very important along the coasts of India. Unlike the other

commercially important species of the genus the juveniles of the species are fished in small numbers only from backwaters and estuaries, the major fishery being from the inshore water up to 45 to 50 m depths.

Maximum length attained is about 180 mm.

Metapenaeus burkenroadi Kubo 1954

Metapenaeus burkenroadi Kubo 1954: 92-93; Dall 1957: 183 (Key); Racek 1957: 6-7; Cheung 1960: 66-68; George 1964: 313-14; Racek & Dall 1965: 72-73; de Bruin 1965: 78-79.
Penaeus affinis Kishinouye 1900: 16-18.
Penaeopsis affinis Balss 1914: 44 (non de Man 1911).
Parapenaeus affinis Rathbun 1902: 38.
Metapenaeus affinis Nataraj 1942: 468; Kubo 1949: 340-44 (part synonymy only).
Metapenaeus mastersii Hall 1962: 23-24 (non Racek 1955, 1957, 1959; Dall 1957, 1958).

Distributed chiefly in waters north of equator ranging from Japan through Hong Kong seas and Malaysia to southern India and Ceylon. From India it was only recently recorded in the inshore waters as well as estuary in Cochin.

Maximum size reached is about 100 mm.

Atypopenaeus stenodactylus (Stimpson 1860)

Penaeus stenodactylus Stimpson 1860: 431.
Penaeus compressipes Henderson 1893: 450-51.
Atypopeneus compressipes Alcock 1906: 45-46.
Atypopenaeus compressipes de Man 1911: 83-84; Kubo 1949: 366-68; Dall 1957: 199 (Key); Kunju 1960: 82-83; Racek & Dall 1965: 84-85.
Parapenaeopsis brevirostris Kubo 1936: 55-58.
Atypopenaeus stenodactylus Hall 1961: 87-88; 1962: 25-26; de Bruin 1965: 94.

General distribution from Indian Seas through Malaysia and Hong Kong waters to Japan. This is a small penaeid prawn recorded from both the coasts in India, off Madras in the east coast in very small number and in Bombay waters in the west coast where it cotributes to a fishery. In the ‘dol’ nets (fixed bag nets) operated at 6 to 15 fathom depths in Bombay waters these prawns are caught in large numbers throughout the

year according to Kunju (1960).

Maximum size reached is only 50 mm in length.

Trachypenaeus pescadoreensis Schmitt 1931

Trachypeneus pescadoreensis Schimtt 1931: 265-68; Hall 1961: 29.
Trachypeneus granulosus Hall 1961: 100.
Trachypeneus furcilla Hall 1961: 102-04.

Distribution south west each coast of India, eastern Malaya and Northern Australia. From Indian waters it is only recently obtained in collection from south east coast (under publication)) and one male specimen from south west coast off Trivandrum. This is the first report of the species from this region. Although the specimens obtained from the coast of India so far are smaller the species attains a maximum size of 90 mm.

Trachypenaeus sedili Hall 1961

Trachypeneus sedili Hall 1961: 100-102; 1962: 30; de Bruin 1965: 92-93.
Trachypenaeus sedili Muthu (in press).

Since Hall (1962) described the species from Malayan waters, de Bruin (1965) recorded it from Ceylon extending its distribution eastwards in the Indian Ocean. Recently in the collection from Visakhapatnam coast in the Bay of Bengal it was obtained (Muthu, press). Maximum size about 60 mm in length.

Trachypenaeus curvirostris (Stimpson 1860)

Penaeus curvirostris Stimpson 1860: 44; Kishinouye 1900: 23.
Penaeus granulosus Miers 1884: 295.
Parapenaeus curvirostris Rathbun 1902: 38.
Trachypeneus asper Alcock 1905: 531; 1906: 43; Cheng-Ming 1965: 14.
Trachypenaeus anchoralis de Man 1911: 88-90.
Trachypeneus curvirostris Alcock 1905: 823; Schmitt 1926: 353-58; Hall 1961: 98-100; 1962: 29; 1966: 99; de Bruin 1965: 92.
Trachypenaeus (*Trachysalambria*) *curvirostris* Racek 1955: 235-56 (except Fig. 4 plate 7); 1959: 10.

Trachypenaeus curvirostris Balss 1914: 11; 1924: 44; Ramadan 1938: 63; Kubo 1949: 393-95; Liu 1955: 14-16; Dall 1957: 203-06; Cheung 1960: 65 (Key); Kunju 1960: 83; Racek and Dall 1965: 89; Cheng-Ming 1965:13; George 1967: 343-44.

This species has a general distribution from eastern Africa through Indian, Ceylon and Malaysian waters to Japan and Australia occurring in depths from 10 to 30 fathoms. In Indian waters it is found both in the east as well as west coasts, but not in very large numbers as to contribute to a fishery. Maximum size is about 95 mm.

Parapenaeopsis uncta (Alcock 1905)

Parapenaeopsis uncta Alcock 1905: 528; 1906: 39; de Bruin 1965: 96-98.
Parapenaeopsis uncta Nataraj 1942: 468; Menon 1956: 346 (Key); Ahmed 1957; Dall 1957: 214 (Key).
Parapeneopsis probata Hall 1961: 96; 1962: 27.

This is a species having apparently limited distribution in Indo-Pacific, being found in Indian, Ceylon and Malayan waters. In India it is recorded from Orissa coast as well as south west coast. Maximum size reached by females is 100 mm in total length.

Parapenaeopsis stylifera (H. Milne Edwards 1837)

Penaeus styliferus H. Milne Edwards 1837: 418.
Penaeopsis styliferus Bate 1881: 183.
Parapenaeopsis stylifera Nobili 1903: 4.
Parapeneopsis stylifera Alcock 1906: 36-37.
Parapeneopsis stylifera var. *coromandelica* Alcock 1906: 37; Menon 1956: 346 (Key).
Parapenaeopsis stylifera de Man 1911: 9; Nataraj 1942: 468; Menon 1956: 346 (Key); Ahmed 1957: 12; Dall 1957: 241 (Key); Rao 1967: Tirmizi 1967: 13; 1968: 193-203.
Parapeneopsis coromandelica Hall 1962: 27; de Bruin 1965: 99.
Parapenaeopsis stylifera coromandelica Racek & Dall 1965: 96-98.
Parapenaeopsis stylifera stylifera Racek & Dall 1965: 98.

Distribution from Indian and Ceylon waters through Malaysian waters to Indonesia and Borneo. In Indian waters it is distributed all along the coastline, more especially on the west coast and south east coast.

Along the entire west coast this is one of the most important commercially exploited species. Unlike the other coexisting commercially exploited species this has no estuarine phase in its life history, the larvae or post-larvae never entering the backwaters and estuaries.

Maximum size reached by females is about 140 mm in length.

Parapenaeopsis cornuta maxillipedo Alcock 1906

Parapeneopsis maxillipedo Alcock 1906: 40-41; Hall 1961: 89-90; 1962: 26; de Bruin 1965: 94-95.
Parapenaeopsis maxillipdedo Nataraj 1942: 468; Kubo 1949: 380-81; Menon 1956: 346 (Key); Dall 1957: 217.
Parapenaeopsis cornutus Cheung 1960: 65 (Key); Cheng-Ming 1965: 15.
Parapenaeopsis cornuta maxillipedo Racek & Dall 1965: 99.

This has an equatorial spread from the west coast of India and Ceylon through Malaysia to the Philippines and New Guinea. In Indian waters although not contributing to a fishery it has been recorded from Bombay and Kerala on the west coast and off Madras on the east coast.

Maximum size attained is 125 mm in length.

Parapenaeopsis nana (Alcock 1905)

Parapenaeopsis nana Alcock 1905: 529; 1906: 41-42; de Bruin 1965: 99.
Parapenaeopsis nana Dall 1957: 214 (Key).

Apparently the distribution of this species is restricted to Indian and Ceylon waters. Even in Indian waters it has been recorded only from the east coast, off Orissa and Madras. It is a small species with females recorded up to 55 mm in length.

Parapenaeopsis sculptilis (Heller 1862)

Penaeus sculptilis Heller 1862: 528; 1865: 122; Miers 1880: 457.
Parapenaeopsis sculptilis Nobili 1903: 5; Balss 1914: 11; Boone 1935: 80-84; Kubo 1949: 389-91; Menon 1956: 346 (Key); Ahamed 1957; Dall 1957: 217-20; Rajalakshmi 1962: 53,55,56; Racek & Dall 1965: 100; Tirmizi 1967: 13; Kirkegaard & Walker 1967.
Parapeneopsis sculptilis Burkenroad 1934: 59-60; Racek 1959: 10, 12, 14.

Peneopsis (printing error) *sculptilis* Alcock 1906: 37-38.
Parapeneopsis affinis Hall 1961: 93-94; 1962: 27.

General distribution from west coast of India through Malaysian waters and Indonesia to Hong Kong in the north and tropical Australia and New Guinea in the south. Along the Indian coasts this is mostly represented in the northern region of the west coast and the east coast. In these places the species contribute to the fishery to a certain extent.

Maximum size attained is about 165 mm in length.

Parapenaeopsis hardwickii (Miers, 1878)

Penaeus hardwickii Miers 1878: 300.
Parapeneopsis sculptilis var. *hardwickii* Alcock 1906: 39.
Parapeneopsis sculptilis var. *cultrirostris* Alcock 1906: 39.
Parapeneopsis hardwickii Burkenroad 1934: 60-64; Hall 1961: 93; 1962; 26-27.
Parapenaeopsis cultrirostris Kubo 1949: 378-80 (not figure 137).
Parapenaeopsis hardwickii Kubo 1949: 385-89 (not figure 140); Dall 1957: 214 (Key); Cheung 1960: 65 (Key); Kunju 1960: 82; Racek & Dall 1965: 101-102; Tirmizi 1968: 137-40.

Distribution from Indian waters through Malaysia to southern China. In Indian waters the species is distributed in the north west coast in Bombay waters and on the east mainly off river Godavari estuary. In these two places it contributes to a fairly good fishery, especially in Bombay waters. Attains a maximum size of about 120 mm in length.

Parapenaeopsis tenella (Bate, 1888)

Penaeus tenellus Bate 1888: 270-71; Kishinouye 1900: 22.
Penaeus crucifer Ortmann 1890: 451.
Penaeus (*Parapenaeopsis*) *tenellus* de Man 1907: 435-36; 454.
Parapenaeopsis tenella de Man 1911: 9, 92; Balss 1914: 11; Yoshida 1941: 15-16; Racek & Dall 1965: 108-09; Thomas (in press).
Parapenaeopsis tenellus Kubo 1949: 371-74; Liu 1955: 16-17; Dall 1957: 221-223; Cheung 1960: 65.
Parapeneopsis tenella Hall 1961: 89; 1962: 26; de Bruin 1965: 98-99.

Distributed from east coast of India and Ceylon through Malaysia to Northern China, Southern Japan and Northern Australia. From Indian waters it has only recently been collected from the east coast from Palk Bay and Gulf of Mannar (Thomas, press) in very small numbers. This is a small prawn growing to a maximum of only about 50 mm in length.

Parapenaeopsis acclivirostris (Alcock 1905)

Parapeneopsis acclivirostris Alcock 1905: 530; 1906: 42-43.
Parapenaeopsis acclivirostris Barnard 1947: 382; 1950: 604-605; Dall 1957: 215 (Key); Kunju 1960: 83; Hall 1966: 99.

The species is very closely allied to *P. tenella* and this has so far been only reported from South Africa, the Persian Gulf and Indian Seas, both east and west coasts. The original record of the species from the east coast by Alcock was based on a collection of only females. Kunju (1960) recorded males also from Bombay waters where it is found in small numbers along with other commercial species. This is also a very small prawn reaching a maximum size of about 50 mm in length.

Family *Palaemonidae*

The Palaemonids are mostly freshwater prawns, sometimes occupying the coastal and brackish waters also. Those coastal species which are found in brackishwaters and which are of some commercial significance are dealt with below:

Palaemon (*Nematopalaemon*) *tenuipes* (Henderson 1893)

Leander tenuipes Henderson 1893: 440; Nobili 1903: 7; Kemp 1917: 206; 1917a: 234; 1925:289; Chopra 1943: 5; Rajalakshmi 1962: 53, 58, 59.
Leander off. *tenuipes* Vatova 1943: 11.
Palaemon (*Nematopalaemon*) *tenuipes* Holthuis 1950: 44-45; Ganapathi & Subrahmanyam 1966: 13; Kunju 1967: 1385.

The species occurs is superficial coastal waters upto a depth of about 20 mm as well as in estuarine and brackishwaters. It has a general distribution from Indian waters through Malaysia to New Zealand. In Indian region it is found to occur mostly in the northern areas of both the east and west coasts where it contributes to good fishery. In the coastal

waters of Bombay as well as in the Gangetic delta area the species is one of the most important commercial prawns.

Attains a maximum size of only 80 mm in total length.

Palaemon (*Exopalaemon*) styliferus H. Milne Edwards 1837

Palemon longirostris H. Milne Edwards 1837: 394.
Palemon styliferus H. Milne Edwards 1840: 638.
Leander longirostris Henderson 1893: 439; Nobili 1901: 3; 1903: 7.
Palaemon styliferus Rathnbun 1902: 51; Suvatti 1937: 50.
Leander sp. de Man 1908: 220.
Leander styliferus Kemp 1915: 273; 1917: 124; 1925: 289; Balss 1930: 316; Rai 1933: 886; Panikkar 1937: 345; Chopra 1939: 223; 1943: 5; Ahmed 1957; Kunju 1956: 1-15; Rajyalakshmi 1962: 53, 58.
Palaemon (*Exopalaemon*) *styliferus* Holthuis 1950: 46-48; Ganapati & Subrahmanyam 1966: 13; Kunju 1967: 1385.

It is distributed in shallow coastal waters and brackish water areas. In some areas it has even been recorded from fresh water. General distribution is apparently restricted to West Pakistan and Indian waters to Malay Archipelago. Along the coasts of India as in the case of *P. tenuipes* this species is also more common in the northern regions of both the coasts. In the Gangetic delta area this is one of the most important commercial species.

It attains a maximum size of about 90 mm in length and spawning is known to occur in the more saline areas.

Macrobrachium rosenbergii (de Man) 1879

Palaemon rosenbergii de Man 1879: 167.
Palaemon carcinus Fabricius 1798: 402; de Man 1879: 165; Rai 1933: 886; Panikkar 1937: 346; Patwardhan 1937: 1-100; Menon 1938: 290; Chopra 1939: 222; 1943: 71; Nataraj 1942: 468; Tiwari 1955: 231-232; Ahmed 1957; John 1957: 93-102; Rajyalakshmi 1961: 1962: 53.

Macrobrachium rosenbergii Holthuis 1950: 111-119 (with complete synonymy); Ling 1961: 55-60; 1962: 1-11; Raman 1964: 21-23; 1967: 649-669; Bhimachar 1965: 1, 4, 6; Rao 1965: 19-25; 1967: 252-79; Ganapati & Subrahmanyam 1966: 13; Kunju 1967: 1385; Jones 1967: 1336, 37; 1967: 9-11.

This is the giant freshwater prawn often occuring in brackishwater environments like lakes and estuaries. The western most limit of its distribution is Indus delta area. It is most widely distributed in the Indo-pacific zone, extending only upto Indo-China in the Asian main land. It is common in most of the lakes and estuaries along the coast line of India. Breeding takes place in the gradient zones of the estuaries, the adults migrating to these zones during the breeding period. The young post-larvae assend to the upper reaches of the rivers. During the monsoon and post-monsoon months the species is fished extensively from the back water systems of Kerala and contributes to a very good freezing industry.

Grows to a maximum length of 300 to 320 mm, males showing the maximum size.

Macrobrachium villosimanus Tiwari 1947

Palaemon villosimanus Tiwari 1947: 329-30; 1955: 231-232.

This is a species with very limited distribution. Outside the type locality of Calcutta, Bengal it has been obtained from Chittagong and Rangoon. Maximum size about 150 mm in body length.

Macrobrachium lamarrei (H. Milne Edwards 1837)

Palemon lamarrei H. Milne Edwards 1837: 397.
Palaemon lamarrei de Man 1897: 767; Henderson & Mathai 1910: 301; Kemp 1915: 265; Balss 1930: 18; Hora 1933: 4, 5; Sewell 1934: 53, 55, 58; Nath 1937: 149; Chopra 1939: 223; Chopra and Tiwari 1949: 214; Tiwari 1955: 234; Ahmed 1957.
Palaemon (*Eupalaemon*) *lamarrei* de Man 1908: 222.
Macrobrachium lamarrei Holthuis 1950: 119-21 (with complete synonymy) Ganapati & Subrahmanyam 1966: 13.

The species occurs in fresh and brackishwaters and it is confined to India and Pakistan. In India it is mostly occurring in the northern region of the east coast from Chilka lake and Bengal.

Macrobrachium malcolmsonii (H. Milne Edwards 1844)

Palaemon malcolmsonii H. Milne Edwards 1844: 8.

Palaemon spinipes birmandicus Schenkel 1902: 503.

Palaemon malcolmsonii Henderson & Mathai 1910: 283; Kemp 1915: 266; Balss 1930: 318; Patwardhan 1937: 1; Chopra 1939: 223; 1943: 5; Chopra and Tiwari 1949: 214; Tiwari 1955: 231, 232; Ahmed 1957; Rajyalakshmi 1962.

Macrobrachium malcolmsonii Holthuis 1950: 121-23; Ibrahim 1962: 433-67; Bhimachar 1965: 1; Ganapati & Subrahmanyam 1966: 13; Jones 1967: 11; 1967: 1336, 37.

The species inhabits fresh and brackishwaters, having a general distribution in India and Burma. It is most common in peninsular rivers that drain in to the Bay of Bengal. On the western side it is known to occur in river Indus. In the northern part of the east coast this species contributes to a fairly good fishery during the monsoon months. Migration to brackishwaters during the breeding season is common in this species also.

Females attain a maximum size of about 180 to 200 mm while males reach a slightly higher length up to 230 mm.

Macrobrachium rude (Heller 1862)

Palaemon rudis Heller 1862: 527; 1865: 114; Henderson & Mathai 1910: 291; Kemp 1915: 268; Balss 1930: 318; Sewell 1934: 35; Menon 1938: 288; Chopra 1939: 223; 1943: 4; Tiwari 1955: 231, 232; Ahmed 1957.

Palaemon (*Eupalaemon*) *rudis* Nobili 1903: 11; Vatova 1943: 13; Barnard 1950: 778-779.

Macrobrachium rude Holthuis 1950: 150-51 (with complete synonymy); Ganapati & Subrahmanyam 1966: 13; Jones 1967: 11; 1967: 1336, 37 (*rudis*).

General distribution is East Africa and Madagascar and the Indian coasts. It is reported from Ceylon also. In India on the west coast the species is found only in the south west region. On the east coast although found throughout the regions it is most common along the deltaic Bengal, Orissa and Andhra coasts. In Bengal the species occurs from August to October. In Chilka lake area it is common from September to November.

It is comparatively a smaller species attaining a maximum length of 120-130 mm, males growing to a larger size than females.

Macrobrachium idae (Heller 1862)

Palaemon idae Heller 1862: 416.
Palaemon idae Ortmann 1891: 717; Estampador 1937: 489; Panikkar 1937; Nataraj; 1942: 468; 1947: 89; Chopra 1943: 5; Tiwari 1955: 231-232.
Palaemon (*Eupalaemon*) idae de Man 1897: 767; Borradaile 1907: 67.
Macrobrachium idae Holthurs1950: 142-46 (with complete synonymy); Kunju 1967: 1385; Jones 1967: 11; 1967: 1337.

This is a fresh water species occurring also in brackishwaters. It has a general distribution from East Africa and Madagascar through Indian coasts to Java, Sumatra and Malayan Archipelago. In India its distribution is more or less similar to that of *M. rude* more common along the east coast. During breeding season migration to brackishwaters takes place. There are stray records from open sea.

Maximun size attained is also similar to the previous species, about 100 to 110 mm in length.

Macrobrachium equidens (Dana 1852)

Palaemon equidens Dana 1852: 26; 1852: 591; de Man 1888: 283; Ortmann 1891: 718.
Palaemon (*Eupalaemon*) *sundaicus* de Man 1897: 779; Nobili 1903: 8; Roux 1932: 569; Barnard 1950: 775-76.
Palaemon sundaicus Lanchester 1901: 568; 1906: 132; Estampador 1937: 489.
Palaemon sulcatus Henderson & Mathai 1910: 289; Panikkar 1937: 346; Nataraj 1942: 468; Tiwari 1955: 231-232.
Macrobrachium sundaicus Suvatti 1937: 49; Cheng-Ming 1965: 25.
Macrobrachium equidens Holthuis 1950: 162-72 (with complete synonymy).

Palaemon sulcatus described by Henderson and Mathai (1910) has been synonymised with *P. sundaicus* and *P. equidens* by Holthuis (1950). This species has a wide distribution extending from Africa to south west New Guinea. But in Indian waters it is found only in Kerala area and in small number. It is found in freshwater as well as brackishwater environments.

It grows to a maximum length of about 100 mm.

Macrobrachium mirabile Kemp 1917

Palaemon mirabilis Kemp 1917: 227; 1917: 234; Sewell 1934: 54, 55; Rajyalakshmi 1961; Tiwari 1955: 231, 232, Ahmed 1957.

Macrobrachium mirabilis Suvatti 1937: 49; Bhimachar 1965: 2; Jones 1967: 1337.
Macrobrachium mirabile Holthuis 1950: 174; Jones 1967: 11.

The species has a distribution extending from India through Burma to Malayan Archipelago and Borneo. It is an estuarine species occurring in India mostly in Gangetic delta area.

The maximum size attained by the species has been recorded to be 65 mm.

Macrobrachium javanicum (Heller 1862)

Palaemon javanicus Heller 1862: 421; 1865: 116; Ortmann 1891: 732; Tiwari 1955: 231-232.
Palaemon (*Parapalaemon*) *javanicus* de Man 1892: 457; Nobili 1900: 483; Roux 1932: 565, 571.
Palaemon (*Eupalaemon*) *neglectus* 1905: 201.
Palaemon neglectus Kemp 1918: 265.
Macrobrachium neglectus Suvatti 1937: 49.
Macrobrachium javanicum Holthuis 1950: 190-93 (with complete synonymy).

Holthuis (1950) established the synonymy of this species with *Palaemon neglectus*. This is a freshwater species found in estuaries also. The general distribution is similar to that of the previous species. In India the species is restricted to deltaic Bengal.

Maximum size attained is about 100 mm in length.

Macrobrachium scabriculum (Heller 1862)

Palaemon scabriculus Heller 1862: 527; 1865: 117; Ortmann 1891: 710; Henderson 1893: 442; Henderson & Mathai 1910: 296; Kemp 1915: 272; Panikkar 1937: 346; Tiwari 1955: 231, 232.
Palaemon dolichodactylus Ortmann 1891: 732; Henderson & Mathai 1910: 300; Colosi 1918: 105; Panikkar 1937: 346; Nataraj 1942: 468; Ahmed 1957: Tiwari 1955: 231, 232.
Palaemon (*Parapalaemon*) *scabriculus* de Man 1897: 786; 1898: 708; Nobili 1900: 483; 1903: 12.
Palaemon dubius Henderson & Mathai 1910: 300.
Palaemon (*Parapalaemon*) *dolichodactylus* Nobili 1903: 13; Calman 1913: 926; Vatova 1943: 12.
Macrobrachium scabriculum Holthuis 1950: 224-27 (with complete synonymy); Jones 1967: 1337.

This is an extremely variable species and Holthuis (1950) synomised *P. dolichodactylus, P. dubius* and *P. scabriculus*. It has got a distribution in the region around the Indian Ocean, extending from Africa, through the south-west and eastern coasts of India to Malay Archipelago. In Indian waters it occurs mostly in the deltaic Bengal, Chilka lake, south west coast in Kerala and south east India in Madras.

Maximum size attained is 100 mm in length.

Pandalidae

There are very few Pandalid prawns of any commercial significance in Indian waters. As a result of recent deep water trawling operations of certain species have been obtained which are of potential commercial significance. These are dealt with below:

Parapandalus spinipes (Bate 1888)

Plesionika spinipes Bate 1888: 646.
Pandalus (*Parapandalus*) *spinipes* Alcock 1901: 100.
Plesionika spinipes var. *grandis* Doflei 1902: 618.
Parapandalus spinipes var. grandis Balss 1914: 31.
Parapandalus spinipes Chilton 1911: 547; de Man 1920: 152; Calman 1939: 201-202; George & Rao: 1966: 330.

General distribution of the species is from Zanzibar area through Red Sea, Gulf of Aden and Arabian Sea to Malay Archipelago and New Guinea. From Indian waters it has been recorded only from the Arabian Sea off the south west coast. In the recent deep water exploratory cruises this is one of the species landed in fairly good quantities from 150 to 200 fathom depths off Kerala coast, so much so it is of potential commercial importance.

Maximum size reached by female is 130 mm in length.

Plesionika martia (A.M. Edwards 1883)

Pandalus martius A. Milne Edwards 1883: 21; Rathbun 1906: 914.
Pandalus (*Plesionika*) *martius* Alcock 1901: 4.
Plesionika martina var. *semilaevis* de Man 1920: 116-21 (with synonymy).

Plesionika martia Kemp 1910: 30; Stebbing 1910: 392; Balss 1914: 30; 1925: 278; Schmitt 1926: 377; Calman 1939: 197; Chace 1940: 190; Barnard 1950: 679; George and Rao 1966: 330.

This is a very widely distributed species occurring both in the Atlantic and the Pacific region. General distribution extends from Eastern Atlantic and Mediterranean through Indian Seas to Japan, Australia and Hawaiian Islands. In Indian waters it is found to occur in both the Arabian Sea and the Bay of Bengal. Alcock's locality includes Andaman Sea also. This species also has been recently obtained in good numbers in the deep water exploratory trawling in depths of 150 to 200 fathoms off Kerala.

Maximum length attained is about 125 mm. In both these Pandalids the rostrum is very long with the result the size of the abdomen which is the actual product of commerce will be comparatively small.

Plesionika ensis (A. Milne Edwards 1881)

Acanthephyra ensis A. Milne Edwards 1881: 14.
Pandalus ensis A. Milne Edwards 1883: 18; Rathbun 1906: 914.
Plesionika uniproducta Spence Bate 1888: 641.
Pandalus (*Plesionika*) ensis Alcock 1901: 96.
Plesionika ensis de Man 1920: 113 (Key); Holthuis 1951: 55-59; Suseelan & Mohamed (under publication).

Like *P. martia* this species also enjoys a world-wide distribution and has been reported from Pacific, Atlantic and Indian Oceans. It is recorded from Barbados, Martinique and Granada of West Indies, Barra Grande in Brazilian coast, Rio muni in Gulf of Guinea, Hawaiian Islands and Andaman Sea. It has recently been reported from the Arabian Sea, specimens obtained in the deep water trawling operations off Kerala coast.

Maximum length attained is more or less the same as the previous species.

Heterocarpus gibbosus Bate 1888

Heterocarpus gibbosus Bate 1888: 634; Wood-Mason 1892: 368; 369; Alcock 1901: 103; de Man 1920: 163-164; George & Rao 1966: 331.

Distributed off Tablas Island, Indian Seas, Bali Sea and Kei Islands. In Indian Seas the species has been recorded from the Arabian Sea, Bay of Bengal and Andaman Sea. This also is one of the species obtained in the deep water trawling operations off Kerala, but not in large numbers.

Maximum size reached in 140 mm in length.

Heterocarpus woodmasoni Alcock 1901

Heterocarpus wood-masoni Alcock 1901: 108; de Man 1920: 156-59; Balss 1925: 286; Calman 1939: 204; George & Rao 1966: 331.

This has a distribution extending from East African coast through Indian seas to Kie Islands. In Indian seas it has been recorded from Andaman Sea by Alcock and recently recorded from the Arabian Sea off Kerala coast. This is one of the dominant species obtained in the recent deep water trawl catches off Kerala. The possibility of commercial exploitation of the species is worth consideraration.

Maximum size attained as shown by the recent catches is 130 mm in length.

Hippolytidae

Hippolysmata (*Exhippolysmata*) *ensirostris* Kemp 1914

Hippolysmata ensirostris Kemp 1914: 118-20; 1916: 403-04; de Man 1929: 128; Ganapati and Subrahmanyam 1966: 12; Kunju 1967: 1385; Bensam & Kartha 1967: 736-743. *Exhippolysmata ensirostris* Balss 1933: 85.
Hippolysmata (*Exhippolysmata*) *ensirostris* Holthuis 1947: 74-75.

This species has a distribution in waters of India, Ceylon, Burma and Sumatra. Along the Indian coasts this species is present in most regions and represented in the fishery in small numbers. In Bombay and Godavary estuary there is fairly good fishery for the species.

Maximum length attained is about 80 mm.

Hippolysmata (*Hippolysmata*) vittata Stimpson 1860

Hippolysmata vittata Stimpson 1860: 26; Lanchester 1901: 563; Nobili 1906: 46; de Man 1907: 423; Balss 1914: 48; Kemp 1914: 113; 1925:330; Borradaile 1917: 403; Gravely 1927: 137; Hale 1929: 67; Yu 1935: 51; Suvatti 1937: 48; Barnard 1947: 386; 1950: 710-11; Pillai 1966: 152-58; Kunju 1967: 1385.
Nauticaris unirecedens Bate 1888: 608.
Hippolysmata (*Hippolysmata*) *vittata* Holthuis 1947: 67-68.

This is more widely distributed than the previous species. Its distribution extends from South Africa through Red Sea, Persian Gulf and Indian Seas to East Indies and Japan. In the matter of economics importance in India it is much less important when compared to *H. ensirostris*. It is represented along with the other species in small numbers.

It is a smaller species growing only to about 40 mm in length.

Sergestidae Dana
Sergestinae Bate

In the family Sergestidae only the genus *Acetes* is important as the commercial shrimps. 5 species belonging to this genus are of some significance commercially. Their systematics is given below:

Acetes indicus H. Milne Edwards 1830

Acetes indicus H. Milne Edwards 1830: 351; 1837: 430; Dana 1852: 608; Walker 1890: 112; Henderson 1893: 452; Pearson 1905: 75; Kemp 1917: 47; Burkenroad 1934: 126; Boone 1935: 101-105; Odefax 1940: 342; Ganapati & Subrahmanyam 1966: 12; Kunju 1967: 1384; Pathansali 1966: 60.
Acetes spiniger Hansen 1919: 43-44.

This is commercially a very important shrimp in India. General distribution of the species from Indian seas through Mergui Archipelago and Gulf of Siam to Malaya and East Indies. In Indian seas it is most common in Bombay waters where it contributes to a substantive percentage of the fishery. On the west it occurs only in the northern region and that in great quantities. On the east coast it is represented throughout the regions, occurring in sea as well as brackishwaters. In Bombay waters

about 20% of the total prawn fishery is contributed by this species. It is found in company with *A.japonicus* on the west coast of India and Mergui Archipelago while present in company of *A. erythraeus* along the east coast of India.

This is the largest among the different species, females reaching 40 mm in total length.

Acetes erythraeus Nobili 1905

Acetes erythraeus Nobili 1905: 394; 1906: 23; Kemp 1917: 51-54; Menon 1933: 2-17; Burkenroad 1934: 126; Colefax 1940: 343; Nataraj 1942: 468; 1947: 142; Kow 1954: 146; Pathansali 1966: 60.
Acetes sp. Hansen 1919: 37-38.

This species has a general distribution from Red Sea through Bay of Bengal and Gulf of Siam to Malay Archipelago. In Indian waters the species seems to be restricted to the east and south-west coasts, found in fairly good quantities in Bengal, Orissa, Madras region on the west coast and off Trivandrum, in the south west coast. Along the Trivandrum coast it occurs in large quantities from the middle of December to the middle of April.

In size it is smaller than *A. indicus*, large females attaining a maximum of only up to 30 mm in length and males only 20 mm.

Acetes sibogae Hansen 1919

Acetes sibogae Hansen 1919: 38-39; Burkenroad 1934: 126; Colefax 1940: 343; Nataraj 1942: 468; 1947: 143-45; Pathansali 1966: 61.
Acetes erythraeus (part) Kemp 1917: 53.
Acetes australis Colefax 1940: 345-53.

Compared to previous species this is of restricted distribution in Indian waters being recorded only from Quilon on the south west coast. General distribution is Bay of Bima and Java Sea, Malaya and New South Wales. Apart from the stray specimen recorded by Nataraj (1947) from Quilon there is no record of the species from other parts of India.

In size this is smaller than *A. indicus* being only 35 mm in total length in the case of largest females.

Acetes serrulatus Kryer 1859

Sergestes serrulatus Kryer 1859: 268.
Acetes insularis Kemp 1917: 54-56; Colefax 1940: 343.
Acetes serrulatus Hansen 1919: 41-43; Burkenroad 1934: 126; Colefax 1940: 343; Kow 1954: 146; Pathansali 1966: 61.

General distribution of the species is in Indo-China Sea, Borneo and Singapore. The typical species is not recorded from India. But a variety of this *Acetes serrulatus* var. *johni* has been recorded from the coastal waters of Travancore by Nataraj (1947). This variety is found abundantly in the coastal waters from the middle of December to the middle of April along with *A. erythraeus*.

This is a small species reaching only to about 20 mm in length.

Acetes japonicus Kishinouye 1905

Acetes japonicus Kishinouye 1905: 163; Kemp 1917: 56-58; Burkenroad 1934: 127; Colefax 1940: 343; Pathansali 1966: 60.
Acetes dispar Hansen 1919: 39-41; Colefax 1940: 343: Nataraj 1942: 468; 1947: 145-46.

The known distribution of the species may be summerised as west and south coasts of India, lower parts of Bay of Bengal, Gulf of Siam, Java, Korea and Japan. In Indian waters it occur along with *A. indicus* and *A. erythraeus* in small numbers. Off Trivandrum coast this species occur in large number only in July.

Large specimens reach a length of about 26 mm.

Acetes cochinensis Rao

Acetes cochinensis Rao (in press)

This is a new species of *Acetes* recorded and described very recently from the collections of Cochin waters. It occurs in the plankton of both the sea and the backwater and in large numbers in May, June.

Maximum size attained is 20 mm in length.

III GENUS *PENAEUS* FABRICIUS 1798

By

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