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A Dichotomous Key to the Species under Genus Metapenaeus Wood- Mason 1891 from Indian Water

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Abstract

Present study deals with the diagnosis of taxonomic characters of penaeid prawn in relation to one of the largest genus *Metapenaeus* found in Indian water. The genus *Metapenaeus* represents 15 species in India. An easy dichotomous key has been provided for proper identification of the species under the genus found in India. The key will be helpful for identification of species of the genus both in field as well as in laboratory.

Key words: Taxonomic Characters *Metapenaeus* Dichotomous Key

1. Introduction

In taxonomy a key is a basic theoretical tool for identification of different taxon of a group of organism. There are several types of identification keys in taxonomy. The more traditional and probably the most common type of key is the single-access key but multi-access and tabular keys are often more useful in taxonomic identification. Among these a dichotomous taxonomic key is a single-access key and very easy to handle both in field and laboratory. A dichotomous key looks at the similarities and differences between objects using a series of paired statements. The paired statements describe contrasting observable physical characteristics. We can choose one statement out of the pair that happens to be true of the object we are trying to identify. The statement we choose may ask us to go on to another pair of statements or it may give us the name of the object. Such type of key in taxonomy is familiar as dichotomous key before going to identify the penaeid prawn we must have to know the taxonomically important physical characters of prawn. Important morphological feature of Penaeods in taxonomic differentiation has already been – commented on in a number of previous literature e. g. Kubo (1949) Dall (1957) Perez Fartante (1969) etc. In this contribution a general scheme of terminology used is adopted by the combination of Dall et al. (1990) and Perez Fartante & Kensiey's (1997) works. discussions. Thus philosophy became a verbal jugglery. In the religious field there was more emphasis on miracles rather than communion with God. The ethics was based on religion and religion depended on God. Hence the efforts importance of human efforts and the sense of responsibility were disappearing. Everywhere one could find superstitions useless discussions and irresponsible behavior. Gautam Buddha revolted these contemporary tendencies and presented rational religion practical ethics and simple principles of life. The important characteristics of Buddhist philosophy can be discussed as under." Features of systematic importance the rostrum the carapace with all its characters the carination sutures length of legs abdominal somites with carination and cicatrix the telson antennules antennae gills and secondary sexual characters e.g. Male petasma appendix masculine and female thelycum etc. were diagrammed and defined as follows.

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A. Lateral View : (1) Cardiac region. (2) Cervical carina; (3) Cervical sulcus; (4) Hepatic spine (5) Gastric region (6) Gastroorbital carina; (7) Orbitoantennal sulcus; (8) Epigastric tooth; (9) Postocular sulcus; (10) Gastrofrontal sulcus; (11) Gastrofrontal tooth; (12) Adrostral carina; (13) Adrostral sulcus; (14) Last rostral tooth; (15) Last ventral rostral tooth; (16) Orbital spine; (17) Postorbital spine; (18) Antennal spine; (19) Postantennal spine; (20) Antennal carina; (21) Orbitoantennal sulcus; (22) Branchiostegal spine; (23) Pterygostomial spine; (24) Hepatic carina; (25) Hepatic sulcus; (26) Pterygostomial region; (27) Marginal region; (28) Inferior carina and sulcus; (29) Branchiocardiac carina; (30) Branchiocardiac sulcus. (31) Pterygostomial sulcus.

B. Dorsal View : (32) Postrostral or median sulcus; (33) Adrostral sulcus; (34) Adrostral carina; (35) Postrostral carina; (36) Gastrofrontal carina; (37) Gastrofrontal sulcus; (38) Orbital spine; (39) Antennal spine; (40) Gastroorbital carina; (41) Orbitoantennal sulcus; (42) Hepatic spine; (43) Cervical sulcus; (44) Cervical carina.

6. **Branchiostegal spine:** Short spine on or near the anterior margin of the carapace ventral to the antennal spine and dorsal to the anteroventral angle of the carapace (Fig.2:A22).
7. **Hepatic spine:** Lateral spine situated near the anterior margin of the hepatic region of the carapace (Fig. 2:A4).

b. Tubercle:

Any blunt pointed ridge on carapace or on any part of body.

c. Carination on carapace

Any ridge or keel on the exoskeleton is known as carina.

1. xAdrostral carina : Ridge flanking the rostrum sometimes nearly reaching the posterior margin of carapace (Fig. 2:A12).
2. Postrostral carina: Dorsomedian ridge extending posteriorly from the base of the rostrum sometimes nearly reaching the posterior margin of the carapace (Fig. 2:B35).
3. Gastrofrontal carina: Short longitudinal ridge extending posteriorly from the ventral extremity of the orbital margin (Fig. 2: B36).
4. Antennal carina: Ridge extending posteriorly along dorsal extremity of antennal region often continuous with antennal spine (Fig. 2: A20).Gastroorbital carina: Short longitudinal ridge extending anterodorsally from the cervical sulcus towards the orbital region (fig.2: A20).
5. Gastroorbital carina: Short longitudinal ridge extending anterodorsally from the cervical sulcus towards the orbital region (Fig. 2:B40).
6. Hepatic carina: Longitudinal (often obliquely) disposed ridge of variable length lying ventral to the hepatic region sometimes extending almost to the anterior margin of the carapace (Fig. 2:A2A).
7. Cervical carina: Medially transverse and laterally oblique ridge extending from the anterior limit of the hepatic region towards mid dorsal line of the carapace (Fig.2:A2).

8. Branchiocardiac carina: Ridge extending along posterodorsal limit of branchiocardiac region (Fig. 2:A29).
9. Submarginal carina: An almost longitudinal ridge extending between ridge and membranous part of the branchiocardiac region.

d. Sulcus on carapace

Any groove on carapace or any part on exoskeleton is termed sulcus.

1. Adrostral sulcus: Groove flanking the rostrum medial to the adrostral carina sometimes nearly reaching the posterior margin of carapace (Fig. 2:A13).
2. Postocular sulcus: A short oblique groove on frontal region (Fig. 2:A9).
3. Gastrofrontal sulcus: Short longitudinal depression accompanying the gastrofrontal carina dorsally (Fig. 2:B37).
4. Orbitoantennal sulcus: Longitudinal or oblique depression between the orbital margin and the hepatic spine (Fig.2: A7).
5. Hepatic sulcus: Groove ventral to the hepatic region extending posteriorly sometimes from near the anterior margin of the carapace (Fig.2:A25).
6. Cervical sulcus: Medially transverse and laterally oblique groove of the carapace extending from near the anterior limit of the hepatic region towards the midline of the carapace (Fig.2:A3).
7. Branchiocardiac sulcus: Groove extending along dorsal limit of branchiocardiac region running parallel to branchiocardiac carina (Fig.2:A30).
8. Postrostral dorsomedial sulcus: Dorso-medium groove on the postrostral carina of the carapace (Fig. 2:B32).

e. Stridulating organ:

Short transverse ridge lined longitudinally or curved upward at the posterolateral part of the carapace.

f. Suture on carapace:

Weakly sclerotized line or seam on the carapace.

1. Longitudinal sutures: Fine longitudinal line extending posteriorly just above the base of the antennular spine.
2. Transverse suture: Fine short vertical line extending dorsally from the ventral margin of the carapace.

3. Abdomen (Fig.1)

The part of the body posterior to the cephalothorax consisting of six body segments or somites plus the telson.

1. Dorsomedial carina: Ridge extending along the middorsal line of the abdominal somites (Fig. 1).
2. Dorsomedian sulcus: Median groove on the dorsomedian carina of the abdominal somites.
3. Dorsolateral sulcus: Longitudinal groove sometimes present close to the dorsomedian line of the sixth abdominal somite. (Fig. 1).
4. Cicatrix: Longitudinally disposed ridge often present on lateral part of sixth or sometimes on fifth abdominal somite (Fig.1).

D. Telson (Fig.4:N,O):

Terminal unit of the abdomen bearing the anus is known as telson.

1. Fixed spine: Spine fixed on distolateral margin of telson (Fig. 3:N).
2. Movable spine: Spine present on distolateral margin of telson capable of movement (Fig.3:O).
3. Spinules: Minute setae present on dorsolateral side of telson.

E. Appendages (Fig.3)

There are nineteen pairs of appendages on the entire body of penaeid prawn: five cephalic eight thoracic and six abdominal.

a. Cephalic

1. Antennule: More medial of the two paired usually flagellate appendages projecting from the anterior end of the cephalothorax.
2. Antennular peduncle: Three basal segments of the antennules from which the flagella arise distally.
3. Antennular flagellum: Multiarticulate paired filaments (sometimes flattened and lamellate) of the antennules.
4. Prosariema: Variable in shape thin sometimes scalelike process arising from the medial base of the first antennular segment and extending distally.
5. Distolateral spine: Lateral spine of first antennular segment at the distal end.
6. Stylocerite: Pointed scale arising from the lateral base of the first segment of the antennular peduncle.
7. Antenna: More lateral of the two paired usually flagellate appendages projecting distally from the anterior end of the cephalothorax (Fig. 3:A).
8. Antennal flagellum: Multiarticulate whiplike terminal part of the antenna (Fig. 3:A 10).
9. Antennal peduncle: Five basal segments of the antenna from which the flagellum arises distally.
10. Scaphocertite: Laterally rigid lamellate exopod of the antenna; the antennal scale (Fig. 3:A).
11. Mandible: One of the heavily calcified jaws lying beneath (in ventral view) the other mouth parts (Fig. 3: C).
12. Mandibular pulp: One to three segmented endopod attached laterally to serve masticatory work of the mandible (Fig. 3: D).
13. Maxilla: Paired mouth part appendages of the fourth and fifth cephalic somites.

b. Thoracic

1. Maxilliped: One of a pair of three sets of thoracic appendages arising posterior to the primary mouth parts. The two anterior pairs are often modified for feeding while the third pair is often pediform resembling the pereopods (Fig. 3: G,H).
2. Pereopod: One of the five posterior paired appendages or legs of the cephalothorax (Fig. 1).

3. Arthrobranchia: Branchia (gill) attached to the joint area between the body and the first podomere of the leg (Fig. 3:H22).
4. Podobranchia: Gill borne on the basal segment (coxa) of a thoracic appendage (Fig. 3: I12).
5. Pleurobranchia: Gill attached to the body wall dorsal to the articulation of the appendage (Fig. 3: H21).
6. Podomere: Any one of the segments of an appendage.
7. Epipode: Lateral exite of the coxa of a thoracic appendage sometimes branchial in function (Fig. 3: I8).
8. Exopod: Lateral ramus of biramous appendages arising from the basis or from the protopodite is known as exopod (Fig. 3: I9).
9. Protopodite: A limb has a basal portion which is attached to the body consisting of two segments the proximal coxa and the distal basis (Fig. 3: KI5).
10. Basal spine: Spine projecting from basis of a thoracic appendage.
11. Ischium: Third podomere from the proximal end of a typically 7 – segmented appendage (Fig. 3: J5).
12. Ischial spine: Spine projecting from ischium or third segment of thoracic appendage.
13. Merus: Fourth segment from the proximal end of a typically 7- segmented appendage (Fig. 3: J4).
14. Carpus: Fifth podomere from the proximal end of a typically 7- segmented appendage (Fig. 3: J3).
15. Palm: Portion of the chela proximal to the podopod finger.
16. Propodus: Sixth or penultimate segment of a typically 7 segmented appendage (Fig. 3: I2).
17. Dactyl: Terminal podomere of a typically 7 – segmented appendage (Fig. 3:I1).
18. Chela: Appendage ending in chela.

c. Abdominal

1. Pleopod: One of the biramous paired appendages typically arising ventrally from each of the anterior five abdominal somites. In the prawns they are primarily swimming organs (Fig. 1).
2. Uropod: Paired biramous appendage attached to the sixth abdominal somite usually combining with the telson to form a tailfan (Fig. 1).
3. Medial ramus of uropod: Inner branch of uropod (fig. 1).
4. Lateral ramus of uropod: Outer branch of uropod (fig. 1).

F. Exoskeletal Ring of an Abdominal Somite

1. Tergum: Arched dorsal part of each of the anterior five abdominal somites (Fig. 1).
2. Sternum: Ventral surface of the cephalothorax or abdomen.
3. Pleuron: One of the lateral flaps on each of the anterior five abdominal somites (fig. 1).

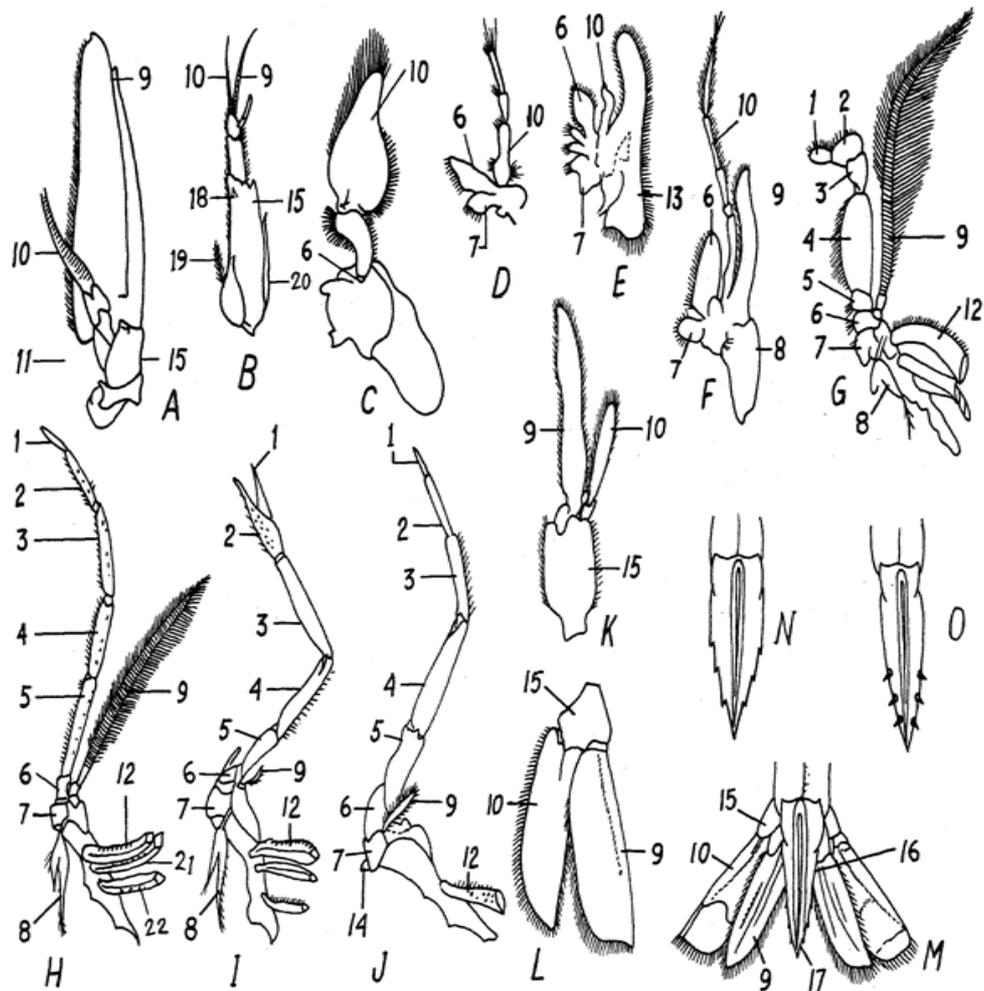


Fig. 3 : Appendages of penaeid prawn

(A) Antenna (Second antenna); (B) Antennule (First antenna); (C) Mandible; (D) First maxilla; (E) Second maxilla; (F) First maxilliped; (G) Second maxilliped; (H) Thirds maxilliped; (I) First pereopod’ (J) Fifth pereopod; (K) Third pleopod; (L) Uropod; (M) Telson with Uropod; (N) Telson with fixed spine; (O) Telson with movable spine.

(1) Dactyl; (2) Propodus; (3) Carpus; (4) Merus; (5) Ischium; (6) Basis; (7) Coxa; (8) Epipod; (9) Exopod; (10) Endopod; (11) Opening of the antennal gland; (12) Branchia Gill; (13) Scaphognathite; (14) Male genital aperture; (15) Protopodite; (16) Telson; (17) Spinules; (18) Parapenaeid spine; (19) Prosartema; (20) Stylocerite; (21) Pleurobranchia; (22) Arthrobranchia.

G. Eye (Fig. 4)

1. Eyestalk: Peduncle or unfaceted part of the eye supporting the cornea (Fig. 4).
2. Cornea: Faceted usually pigmented portion of the eye (Fig. 4).
3. Ocular plate: Median cephalic plate bearing the eyestalks laterally (Fig. 4).
4. Ocular sac: Scale like structure located on basal segment of eyestalk.
5. Optic calathus: Terminal article of the eyestalk supporting often embracing the cornea of the eye (Fig. 4).

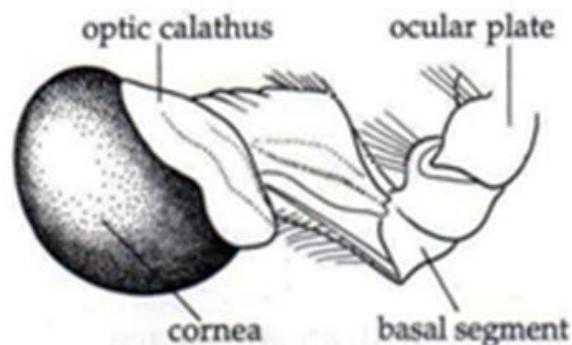


Fig. 4 : Features of Eye (After Pérez Farfante & Kensley 1997).

Secondary Sexual Structure

a. Petasma: The male genital structure consisting of the much enlarged and coupled endopods of the first pair of pleopods (Fig. 5).

1. Median lobe: One of the paired dorsal parts often folded of the petasma (Fig. 5).
2. Dorsomedian lobule: Dorsal part of the median lobe of the petasma (Fig. 5).
3. Ventromedian lobule: Lateral part of the median lobe of the petasma (Fig. 5).
4. Distomedian projection: Distal relatively narrow extension of the dorsomedian lobule of the petasma (Fig. 5).

5. Lateral lobe: One of the paired lateral parts often folded of the petasma (Fig. 5).
6. Dorsolateral lobule: Dorsal part of the lateral lobe of the petasma (Fig. 5).
7. Ventrolateral lobule: Ventral part of the lateral lobe of the petasma (Fig. 5).
8. Ventral costa: Ridge extending along the ventromedian margin of the ventro lateral lobule of the petasma (Fig. 5).
9. Distoverventral projection: Outer distal flap articulating with distal extremity of ventrolateral lobule of petasma.

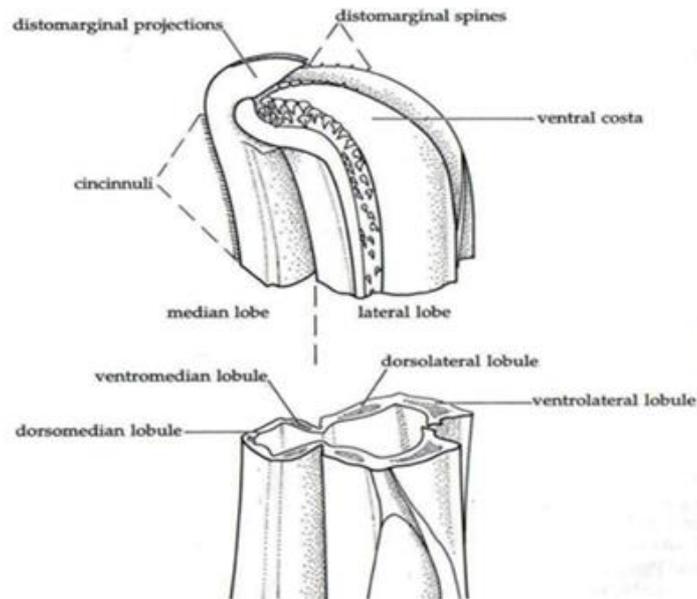


Fig.5: Features of Patasmaa(after perez farfante& kensley,1997)

Type of Petasma

- Open: Lateral lobes flexible partially or entirely extended laterally with the ventral costae not or barely turned ventrally.
- Semi – open: Lateral lobes flexible but folded,with the ventral costae distinctly turned ventro-medially delimiting relatively ample space extending from proximal to distal ends.
- Closed: Lateral lobes heavily sclerotized sometimes making structure virtually rigid with the ventral costae situated ventromedially almost abutting and delimiting a small sometimes extremely so space; lateral lobe

usually produced distally into lateral spouts or horns.

- Semi – closed: Latrral lobes rather flexible markedly folded supported by strong ribs with the ventral costae approaching rather closely delimiting moderately large space narrowly open distally where usually overlapped by well developed distomedian projection.

d. Thelycum .The female genitalia consisting of modifications of the posterior two or sometimes three thoracic sternites serving for the storage or transfer of the sperms to spermatophores (fig. 6).

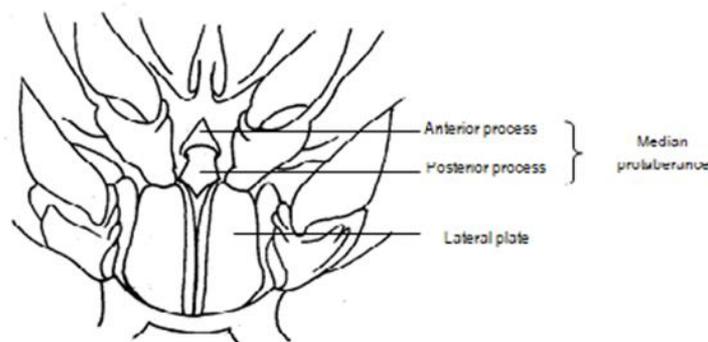


Fig.6: Features of thelycum

1. **Lateral plate:** One of the paired adjacent flaps sometimes present on sternite XIV in female thelycum
2. **Median protuberance:** Conspicuous elevation sometimes plate like (termed anterior plate) arising from the posteromedian part of the sternite XIII (Fig. 6).
 - a) **Anterior process:** Anterior part of an elongate median protuberance lying on XIII thoracic sternite.
 - b) **Posterior process:** Posterior part of an elongate median protuberance lying on XIII thoracic sternite.
3. **Seminal receptacle:** Paired or unpaired bulbous or

tubular sacs associated with the thelycum for the storage of sperm situated immediately dorsal to plates of sternite XIV sometimes XIII and XII.

Types of thelycum

- **Open:** One in which the seminal receptacles are absent.
 - **Closed:** One in which the seminal receptacles are present.
- a. **Appendix masculine:** Lappet sometimes scalelike at the medial base of the endopod of the second pleopod in males (Fig. 7).

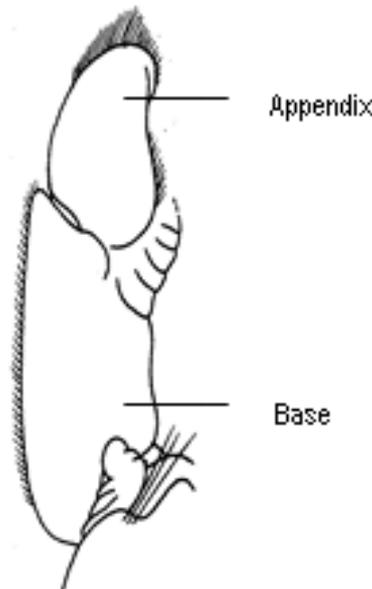


Fig. 7: Appendix masculine

Methods

Specimens preserved in national collection of Zoological Survey of India Kolkata; Central Marine Fishery Research Institute Cochin Kerala and Mandapam Tamil Nadu; National Institute of Oceanography Goa has been studied thoroughly and the taxonomic characters has been tabulated to construct a dichotomous key. The materials preserved in rectified spirit (90%) and body parts of taxonomic importance have been dissected and studied under a stereoscopic binocular microscope. The illustrations have been drawn with the aid of line drawing and by cameralucida. Consulted different literature like George (1979) Kubo (1949) Dall (1957) Dall et al. (1990) and Perez Fartante & Kensiey's (1997) for selecting taxonomic characters.

Results

Genus *Metapenaeus* Wood-Mason 1891

The genus *Metapenaeus* was created by Wood-Mason (1891) with *Penaeus affinis* Milne Edwards 1837 as type from Kerala coast West coast of India. Genus *Mangalura* was created by Miers (1878) with *Mangalura dobsoni* as type from Mangalore coast West Coast of India. Nobili (1903) transferred the species to *Metapenaeus* Wood-Mason (1891). *Metapenaeus* has been placed on the official list of Generic Names in Zoology International Commission on Zoological Nomenclature 1969 Opinion 864 Name No. 1829 Bull. Zool. Nom. 25(4/5): 140. "Ruled

under the plenary powers to be given precedence over *Mangalura* Miers 1878". A brief history of the genus with special reference to Indian contributions are given below.

- 1878 *Penaeus* Miers Proc. Zool. Soc. London: 301.
 1878 *Mangalura* Miers Proc. Zool. Soc. London: 303;
 1891 *Metapenaeus* Wood-Mason Ann. Mag. nat. Hist. 8(6): 271; George 1969a Bull. Cent. Mar. Fish. Res. Inst. No. 14: 5-48; 1969b Bull. Cont. Mar. Fish. Res. Inst. No. 14: 77-126; 1970 FAO Fish. Rep. (57)4: 1335-1357; 1972 Indian J. Mar. Sci. 1: 89-92; 1980 J. Bombay Nat. Hist. Soc. 76: 297-304; George and Suseclan 1982 Proc. Symp. Coastal Aquaculture 1: 273-284; Silas and Muthu 1974 J. mar. biol. Ass. India 6(2): 645-648; Paulinose and Vengayil 1987 J. Indian Soc. Coastal Agric. Res. 5(2): 431-436; Dall et al. 1990 Adv. Mar. Biol. 27 : 79.
 1901 *Peneus* (*Metapeneus*) Alcock Descr. Cat. Indian deep-sea Crust. : 14.
 1905 *Metapeneus* Alcock Ann. Mag. nat. Hist. 16(7): 516; 1906 Cat. Indian Dec. Crust. 3(1): 16.
 Type Species: *Penaeus affinis* Milne Edwards 1837 Hist. Nat. Crust. 2: 416.
 Type Locality: Kerala Coast Southwest Coast of India.

Diagnosis of the Genus

Body pubescent or glabrous; rostrum dorsally toothed; carapace with blunt orbital spine antennal and hepatic spines prominent pterygostomial spine absent; gastroorbital carina absent; postocular sulcus deep;

orbitoantennal cervical and hepatic sulcus prominent accompanied by ventral carina hepatic sulcus anterior to hepatic spine hepatic carina descends vertically from spine; branchiocardiac carina developed variably in different species sometimes indistinct; transverse and longitudinal suture absent; sixth abdominal somite with single long or interrupted cicatrices; telson lacking subapical fixed spine has movable sometimes minute numerous posterolateral spines present; antennule lacking parapeneid spine flagella moderate slender shorter than carapace; basal spine present on first second and third pereopod; in some species ischial spine present on first pereopod; fifth pereopod modified in male; ischium usually bearing distolateral keel shaped structure merus containing proximal notch followed by a distal conspicuous knob or spiniform process; exopod lacking on fifth pereopod this is the most unique character of the genus; petasma symmetrical semiclosed depressed median lobes usually produced into curved hood like or convoluted distal projections; sclerotized lateral lobes produced distally in spoutlike obliquely or fully lateral projections and with ventrolateral recurved flaplike to complex medial process; appendix masculina longer than wide narrow basally expanded distally and convex ventrally; thelycum closed with paired lateral plate on sternite XIV often continuous across sternite usually more or less enveloping posterior end of elongate median protuberance of sternite XIII.

Remarks

George (1979) presented a comprehensive key to 11 species of *Metapenaeus* considering material and data then available to him from Indian water. Present study reveals that there are 15 species of *Metapenaeus* in Indian region. The following dichotomous key will certainly be helpful to separate the all species found in Indian water. Present key refers to adult criteria only.

Key to the species found in India

1. Anterior thelycal plate present on sternite XIII 2
Anterior thelycal plate absent on sternite XIII *M. stebbingi* Nobili 1904.
2. Rostrum short not exceeding second segment of antennular peduncle; epigastric tooth close to penultimate tooth on rostrum 3
Rostrum moderate exceeding second segment of antennular peduncle; epigastric tooth conspicuously separated from penultimate tooth on rostrum 4
3. Rostrum very short not exceeding first segment of antennular peduncle; telson without lateral movable spine; body pubescent; distomedian projection of petasma with a minute filament on distomedian margin ... *M. lysanasa* (De Man 1888)
Rostrum exceeding first segment of antennular peduncle; telson with two pairs of lateral movable spine; body smooth; distomedian projection of petasma with a long slender apical filament on either side .
..... *M. brevicornis* (Milne Edwards 1837).
4. Entire body pubescent5
Pubescence restricted on some regions of carapace and abdomen 9
5. Branchiocardiac carina mostly indistinct when distinct not continuous with the hepatic spine 6
Branchiocardiac carina always distinct and continuous with hepatic spine..... 7

6. Ischial spine absent on first pereopod; the basal side of the anterior plate of thelycum without a pair of median boss; distomedian projection of median lobe of petasma round does not exceed distolateral projection bearing a short filament on both ventral and dorsal sides*M. dobsoni* (Miers 1878).
Ischial spine present on first pereopod; a pair of median boss present on either side of the base of anterior thelycal plate; distomedian projection of median lobe of petasma round exceeding distolateral projection without filamentous structure on it
.....*M. bengalensis* Tirmizi 1971
7. Distomedian projection of petasma crescent-shaped; anterior plate of thelycum wide posteriorly deeply grooved longitudinally *M. affinis* (Milne Edwards 1837).
Distomedian projection of petasma convoluted and swollen; anterior plate of thelycum narrow long and deeply grooved 8
8. Antennular flagella unequal upper one longer; distomedian projection of petasma bisected into two bulbiform structure; lateral plate of thelycum with strongly raised lateral margins forming two longitudinal crests..... *M. monoceros* (Fabricius 1798)
Antennular flagella equal; distomedian projection of the lobe bisected anteriorly into two conical structure tip of which with a small pore through which a fine needle can be inserted; lateral plate of thelycum with strongly raised lateral margins curving inward like two flap of collar*M. ensis* (DeHaan 1844).
9. Adrostral sulcus extending posteriorly upto the level of epigastric tooth10
Adrostral sulcus extending posteriorly beyond epigastric tooth 11
10. Branchiocardiac carina distinct upto half the length of carapace there after indistinct upto hepatic spine; telson without lateral movable spine with a row of minute spines; no median boss on thelycum*M. eboracensis* Dall 1957
Branchiocardiac carina indistinct; telson with 3 pairs of movable lateral spines; thelycum with a median boss*M. intermedius* (Kishinouye 1900).
11. Postrostral carina ending near posterior margin of carapace; anterior plate of thelycum flask-shaped its anterior margin with three apical tubercles; distomedian projection of petasma laminose*M. moyebi* (Kishinouye 1896)
Postrostral carina ending before posterior margin of carapace; anterior plate of thelycum not flask-shaped no tubercle on anterior margin; distomedian projection of petasma not laminose 12
12. Branchiocardiac carina distinct not reaching hepatic spine; thelycal plate on sternite XIV posteriorly bound by a pair of anteromedially curved transverse protuberances*M. krishnatrii* Silas and Muthu 1976
Branchiocardiac carina reaching hepatic spine; no transverse protuberance at posterior border of thelycal plate on sternite XIV.....13
13. Anterior plate of the thelycum narrow posteriorly and wider anteriorly; distomedian projection of median lobe of petasma petaloid.... *M. elegans* DeMan 1907.
Anterior plate of thelycum broader posteriorly and

- narrow anteriorly; distomedian projection of median lobe of petasma crescent-shaped or slender14
14. Distomedian projection of median lobe of petasma crescent-shaped placed transversely its distal end broad; posterior extension of anterior median plate on sternite XIII not bounded laterally by a plate on either sideM. kutchensis George George and Rao 1963. Distomedian projection of median lobe of petasma slender directed anterolaterally with distal end broad and trilobed; posterior extension of anterior median plate on sternite XIII bounded laterally by a pair of oval flat plate on either side.....M. alcocki George and Rao 1966.

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